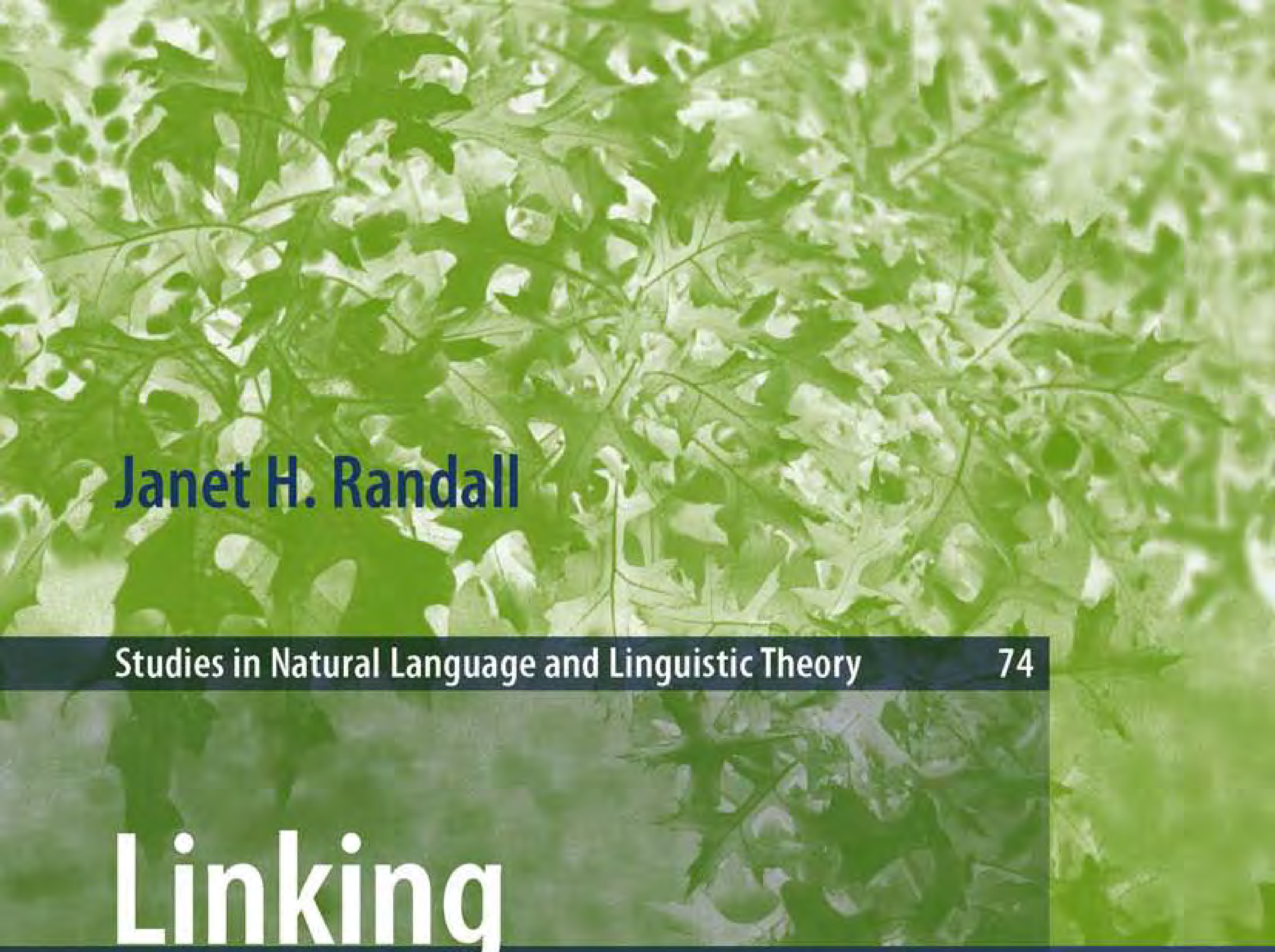

Janet H. Randall

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The Geometry of Argument Structure

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LINKING

The Geometry of Argument Structure

by

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Springer

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In memory of Roslyn Seigel Randall
1925–2003

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This book started out, a long time ago, as an investigation into resultative verbs, co-authored by Jill Carrier, then of Harvard University. Our first conversations, at the outdoor bistro tables at the Cafe Algiers (hotbeds of intellectual life that, unfortunately, no longer exist), led first to a long paper, then to a widely circulated (1986) manuscript, *From Conceptual Structure to Syntax: projecting from resultatives*. It is that work that was cited in many places as forthcoming with Foris (our erstwhile publisher) and was the object of a long reply in Ray Jackendoff's (1990) *Semantic Structures* (Chapter 10).

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List of Abbreviations

APF	Adjectival Passive Formation
AS	Argument Structure
CS	Conceptual Structure
DS	D-Structure
EPP	Extended Projection Principle
ILH	Isomorphic Linking Hypothesis
LCS	Lexical Conceptual Structure
MF	Middle Formation
NF	Nominal Formation
PADF	Prohibition Against Double Fusion
PCF	Passive Compound Formation
RF	Resultative Formation
THH	Thematic Hierarchy Hypothesis
UTAH	Uniformity of Theta Assignment Hypothesis
VPF	Verbal Passive Formation

Introduction

1 A Phenomenon and a Principle: The Isomorphic Linking Hypothesis

This book proposes a theory of “linking”, the mapping between the meanings of words and the syntactic forms that they take. Its aim is to uncover the principles that relate a word’s lexical-semantic representation to the syntactic structures that it appears in. Consider the verb *shelve,* in (1).

(1) [The librarian] shelved [the dictionaries].

This sentence means something like “the librarian put the dictionaries on a shelf (or shelves),” with three lexical-semantic arguments – an agent (the librarian), a theme (the dictionaries) and a location (on shelves). Yet only two of these arguments are syntactically realized: the agent and the theme. And the positions to which these arguments link are tightly constrained: the agent argument links to subject position and the theme, to object. Reversing the linkings results in ungrammaticality:

(2) *[The dictionaries] shelved [the librarian].

The main claim in this book, set forth and defended in Part I, is that the syntactic arrangement of the arguments of a predicate is determined by the geometry of its lexical entry. Specifically, the syntactic positions of a predicate’s arguments must reflect their structural relationships in lexical semantics, the representation that we call lexical Conceptual Structure, or CS.[1] We express this as the *Isomorphic Linking Hypothesis* (ILH), stated in preliminary form in (3).

(3) **Isomorphic Linking Hypothesis** (informal version)
The linking nodes at CS map isomorphically into the terminal nodes in the syntax.

For *shelve* in (1), the Conceptual Structure (CS) representation – like the CS for many other causative verbs – has two linking CS arguments, shown schematically using circles in (4a). These arguments must link to the syntax isomorphically, that

---

[1] This representation is commonly called Lexical Conceptual Structure, LCS.

J. Randall, *Linking: The Geometry of Argument Structure*, 1–8

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Introduction

1 A Phenomenon and a Principle: The Isomorphic Linking Hypothesis

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J. Randall, *Linking: The Geometry of Argument Structure*, 1–8

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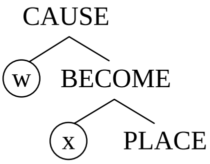
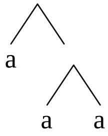
is, *with their relative hierarchical positions preserved*. In linking to the schematic syntactic structure shown in (4b) the Argument structure (AS) representation, the highest CS argument in (4a), w, must link to the highest a position and the lower argument, x, to one of the relatively lower a positions.

(4) a.



b.

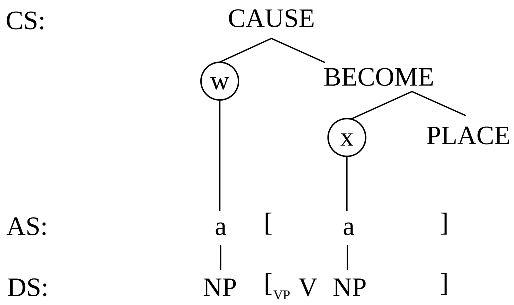


c. a [a a]

The AS tree in (4b) translates into the equivalent AS bracket notation in (4c): the highest a is the external argument position, outside the brackets and the two lower a's are internal argument positions, inside.

The linking between the CS and AS for *shelve* is shown schematically in (5). The two CS arguments link to two argument positions in the AS line. The outer argument, w, links to the external argument position, which corresponds to the subject position at D-Structure (DS). The innermost argument, x, links to the internal argument at D-Structure.[2]

(5)



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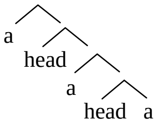
[2] For purposes of transparency, NP rather than DP is used throughout this work. For D-Structures with multiple verbal heads, as in (i) (e.g., McGinnis, 2004), the inner argument links to the innermost argument at D-Structure (i.e., the complement position of the innermost verbal head).

(i)



2 Representations

Notice that we define linking as between Conceptual Structure (CS), the lexical representation of predicates and their arguments, and D-S(tructure), the entry point of the syntax. But in the linking picture in (5), an abstract Argument Structure (AS) line is situated between CS and the more articulated DS, which shows the syntactic category of each argument. This representation is misleading in that it seems to imply that AS is a level of representation separate from DS and CS. However, AS is not an additional level. Rather, it is an interface, a notational shorthand for DS, containing just those CS elements that are relevant to the syntax. It abstracts away from the details of syntactic category and the particulars of the clause nucleus and registers only the positions for each of the CS arguments designated to link, according to our linking principles. As such, AS contains only information that is available from CS or DS or, as will become clear below, from the linking rules. Using this abstract representation will allow us to propose a highly abstract, geometric linking theory. As such, we will continue to show linking between CS and AS, not between CS and DS, bearing in mind that AS is a simplified representation of DS.

Now that we have a clear idea of what we mean by AS, we can name the abstract representation in (4b)/(4c) the “AS template”. It will usually appear in our representations in the (4c) form, with an AS label to its left, as in (6). It will have three arguments, or fewer, depending on how many arguments in CS link.

(6) AS: a [a a]

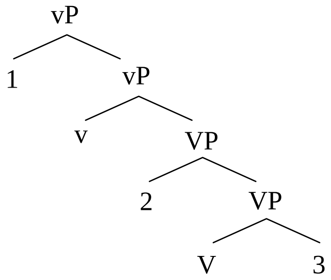
With this understanding of AS, we can now restate the Isomorphic Linking Principle in (3) as (7):

(7) **Isomorphic Linking Hypothesis** (preliminary version)
The linking nodes at CS map isomorphically into the terminal nodes at AS.

We will elaborate on this hypothesis in the context of our linking theory in Chapter 3 and present it in final form in Chapter 5, Section 3. For now, informally, the idea is that a linking CS node, *a*, is associated with AS argument position, m(*a*), in such a way that the geometric properties of *a* are inherited by m(*a*). So, for example, if *a* has a unique sister, so does m(*a*), if *a* c-commands *b*, then m(*a*) c-commands m(*b*), and so on. For the CS in (5), since w c-commands x, the *a* in the AS that w links to must c-command the *a* that x links to.

As (5) also shows, along with a streamlined AS line to illustrate linking, we are representing D-structure in simplified form. For example, the innermost CS argument (here, x), is shown simply as linking to the innermost argument at D-structure (i.e., the complement position of the innermost verbal head). The full-blown D-structure in which the arguments are positioned will depend on one’s theory of the clausal nucleus. For example, to map the three arguments in (8a) into a VP shell as in (8b), where the node separating internal from external arguments is VP, the external *a* maps into position 1 outside VP, the other two *a*’s map into positions 2 and 3 inside VP, and positions 2 and 3 are hierarchically structured.

(8) a. a [a a] b.



Other syntactic representations would split internal from external arguments in other ways and may or may not hierarchically distinguish the internal arguments. But (5) is intentionally theory-neutral. And specifically, in our notation, DS, and its shorthand AS, is to be interpreted as distinguishing one higher external argument from at most two internal – and, for our purposes, hierarchically equivalent – arguments.

There is one more preliminary clarification needed about the representation in (5): in the approach to be presented here, linking is not a unidirectional mapping *from* CS *to* DS (in our 3-line notation, from CS to AS to DS). It is bi-directional, essentially, an interface condition on the compatibility of geometries of two representations.[3] We will sometimes talk about linking "from" CS "to" the syntax, using a conceptualization that is widespread and more familiar, but we want to be clear that we are not actually making a claim about directionality.

Though a lot of work has been done since the pioneering research of Jackendoff (1990), our research takes off from that early – but carefully and extensively argued – framework. We take up several analyses proposed in that work, adopting some, in whole or in part, challenging others, and offering alternatives. As we work in and develop that system, we will argue for a number of technical improvements intended to reduce the number of primitives and streamline the notation.

Our claim that syntactic structure is a geometric reflection of lexical Conceptual Structure provides a framework in which to explain the linking patterns of a range of verb classes. And it will allow us to reason "backwards": from how a verb's arguments link to what its correct (or incorrect) lexical representation must be. We will pursue both of these directions in the pages that follow, but first we must answer one question: why propose a new theory of linking when theories of linking abound?[4] While, in a sense, we will address this question throughout this book, it may be useful to say something about it right at the outset.

---

[3] As such, this approach contrasts with most linking theories, the majority of which map from semantic representations to syntactic, but also with those that go the other way, from syntax to (L)CS, for example, Emonds (1991, 2000), and "constructionist" or "neo-constructionist" approaches such as Borer (2003, 2005).

[4] Many theories of linking, sometimes called "argument realization" are discussed in detail in the wide-ranging survey of Rappoport Hovav & Levin (2005). See also Juarros (2003, Chapter 1) for another recent overview.

3 The Competition

Most approaches to linking take one of two directions. “Hierarchy” theories, (called “Prominence Relation Preservation” theories in Rappaport Hovav & Levin, 2005), claim that the syntactic position that a semantic argument links to depends on other linking arguments, based on their relative positions in a hierarchy – essentially, an ordered list – of semantic or thematic roles (e.g., Agent, Theme, Goal/Source/Location). In contrast, “Equivalence Class Preservation” theories posit a mapping (one-to-one, in the strongest form) between semantic roles and syntactic positions, each particular semantic role projecting to a particular position in the syntax, with movement operations accounting for surface deviations. Taking a classic representative of each of these two approaches, the Thematic Hierarchy Hypothesis, or THH (versions of which go by various names in Ostler, 1979; Carter, 1976; Carrier-Duncan, 1985; and Jackendoff, 1990 and later) and the Uniformity of Theta Assignment Hypothesis, or UTAH (Baker, 1988, 2001), we show why both approaches are problematic.

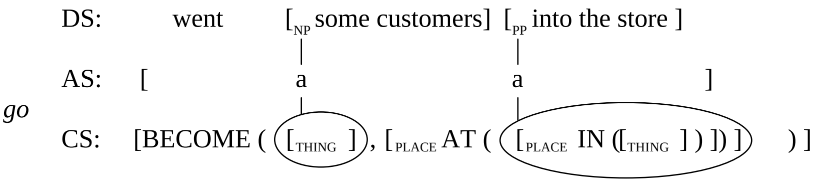
THH-style theories encounter problems with the linking of outputs of lexical processes that add arguments “higher” in the CS geometry. For example, causative verbs with agents can be the input to productive causative rules in many languages, and the THH has nothing principled to say about how linking works for the “double-causative” output verb, which has two agents. Moreover, both UTAH-style and THH-style approaches encounter problems with how certain non-causative verb classes link, linking the subject NPs of both verbs in (9) alike, though in fact, we will demonstrate that before movement, the subject of *go* in (a) links internally and the subject of *enter* in (b), links externally.

(9) a. [$_{NP}$ Some customers] went into the store.
b. [$_{NP}$ Some customers] entered the store.

4 Advantages of this Proposal

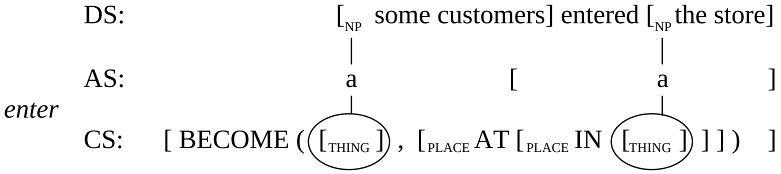
Our Isomorphic Linking Hypothesis (ILH) avoids the problems encountered by both of the other linking approaches. Consider briefly (we address this in detail in Chapter 3) how *go* and *enter* in (9) would link under the ILH, where what is crucial is that the CS arguments the syntactic arguments be in the same hierarchical relation. *Go*, in (10), has two linking CS arguments (circled), a THING and a PLACE. (The circle notation, which we will continue to use for clarity throughout, will be explained in Chapter 1, Section 2.)

(10)


DS: went [NP some customers] [PP into the store]
AS: [a a]
go
CS: [BECOME ([THING], [PLACE AT ([PLACE IN ([THING])])])]

As equally embedded sisters in CS, these arguments project to two internal sister positions, shown on the simplified AS line, and map to DS object NP and PP positions.[5] In contrast, for *enter*, the two linking CS arguments, both THINGs, are not CS sisters; one is higher than the other. They project as in (11), to external and internal AS positions (one outside and one inside the brackets), and map to DS subject and object positions.

(11)


DS: [NP some customers] entered [NP the store]
AS: a [a]
enter
CS: [BECOME ([THING] , [PLACE AT [PLACE IN [THING]]])]

In other words, *go* links like an unaccusative and *enter* links like a causative verb. Notice that *enter* is in fact *not* a causative verb, since there is no agent or CAUSE in its CS. But this verb (and others like it) can link just like a causative because what determines linking under the ILH is the geometry – not the semantic content – of lexical representations.

But avoiding the pitfalls of other linking theories is only one advantage of the ILH. In the following chapters, this geometric approach to linking will allow us to reconsider and resolve many issues in the theory of argument structure.

There is the term "argument" itself. Applying a critical lens to the definition of argument, we consider how arguments are represented in lexical entries, how they project to syntactic positions, how they can remain "unprojected" – or "implicit" – and how arguments differ from adjuncts. A range of tests for syntactic argumenthood will allow us not only to predict internal/external argument mappings but also to make a number of simplifications in the theory of argument structure. One is to eliminate the distinction between direct and indirect internal arguments, which we show is unnecessary. The argument inventory will then include just two types: external and internal.

There are classic problems involving the Theta Criterion, including how to account for optional arguments. In contrast to some accounts (e.g., in the Distributed Morphology literature),[6] by assigning a given morphological verb multiple lexical entries related by rule, our linking approach can handle in a uniform way many classes of lexically derived verbs, including passives, middles, resultatives, and causatives, alternating transitive/intransitives (*break*) and verbs with unexpressed arguments, including objects (*the chef cooked (the meal)*), reciprocals (*he washed (himself)*), reflexives (*they kissed (each other)*), and other verbs with optional arguments (*Rosco delivered the letter (to the mayor)*).

---

[5] In fact, we will revise this representation for *go*. But it will still be an unaccusative verb, and the representation will obey the same geometric principle.

[6] See, for example, Halle and Marantz (1993, 1994); Harley (1995); and Alexiadou (2001) and subsequent work.

And there is the problem of adjuncts. Since in our view the Theta Criterion does not apply to adjuncts, it cannot explain adjunct selection (*the queen buttered her crumpet* [*with margarine*]/[**with olive oil*]) or how to prevent adjuncts from duplicating semantic elements already provided by arguments (*the queen put butter on her crumpet* [**with margarine*]). We fill these gaps in adjunct theory by developing and constraining the notion of “fusion” (Jackendoff, 1990), which governs how predicates and their arguments combine into representations of sentences.

With the expanded notion of “Clausal Fusion” and a new constraint, the Prohibition against Double Fusion, we solve this and another linking challenge: why in the resultative verbs in (12), the postverbal NP links as an argument of the verb in (12a) but not in (12b) (Carrier & Randall, 1992).

(12) a. The gardener watered [$_{\text{NP}}$ the tulips] flat.
b. The joggers ran [$_{\text{NP}}$ their Nikes] threadbare.

Solving the puzzle of resultative linking leads us, in turn, to unexpected – and parsimonious – conclusions about other verb classes, which we explore in Part II. The *put* class in (13) is usually assumed to project three NP arguments to the syntax, as in (13a). However, we propose that verbs like *put* project only two, as in (13b): the NP, *Hepzibah*, and the PP headed by *on*.

(13) a. [$_{\text{NP}}$ Hepzibah] put [$_{\text{NP}}$ her hat] on [$_{\text{NP}}$ the hook].
b. [$_{\text{NP}}$ Hepzibah] put her hat [$_{\text{PP}}$ on the hook].

A battery of argument tests demonstrates that *her hat* is not an argument of the verb; it is the external argument of the preposition *on*. This is a side-effect of how predicate-argument relations are compositionally built up, each predicate linking its arguments in its own geometrically defined domain.

Unaccusative verbs are also reanalyzed, and our new definition of unaccusativity explains an array of unaccusative classes, which though different in argument structure, all obey our geometric linking principle and are consistent with our account of predication. Our theory also leads us to challenge standard assumptions about the argument structures and conceptual structures of a wide variety of “alternating” verbs, including unergative/unaccusative, locatives (*spray/load*), and causatives.

5 Going Forward

Any new linking theory must, at a minimum, make correct predictions about where and how arguments are expressed and improve on theories that have come before. But our goal, beyond this, is to integrate linking with a simple and consistent account of the lexicon-syntax interface. Though the general idea to be pursued here is not new – that linking patterns reflect relations among arguments – our particular geometric approach requires revisiting and questioning a number of assumptions about lexical representations, argumenthood, argument realization, the Theta Criterion and predication. By the end, we hope to have provided a framework that invites others to develop and challenge our proposals as well as extend them to topics and languages beyond those that we manage to touch on.

Part I

A Geometric Theory of Linking

Chapter 1
Conceptual Structure

1.1 Motivating Conceptual Structure: A Review of the Problems with Theta Grids

The job of a theory of linking is to make sense of the semantics-syntax mappings across all verb types. Can we predict, from the semantic arguments in a verb's lexical representation, the number, type, and arrangement of syntactic arguments that the verb takes in a sentence? Consider number. It is true that for many verbs, the number of semantic arguments matches the number of syntactic arguments. For example, *devour* requires a "devourer" and a "devouree" – in the terms of traditional theta grids, an agent (internal argument, inside the square brackets) and a theme (external, outside the brackets) – both of which link to syntactic NP positions.

(1) [$_{NP}$ the kids] devoured [$_{NP}$ the pizza]
| |
devour: agent [theme]

A verb like *think* also takes two semantic arguments, a thinker and a thought, both of which also link to the syntax, but the thought usually links as an embedded sentence:[1]

(2) [$_{NP}$ Willy] thinks [$_{CP}$ that worms can swim]
| |
think: agent [proposition]

Giggle requires a giggler, and nothing else, and this one argument links.

(3) [$_{NP}$ gorillas] giggle
|
giggle: agent [ ]

---

[1] Cognate object NPs also do occur: *Willy was thinking dangerous thoughts*.

J. Randall, *Linking: The Geometry of Argument Structure*, 11–34

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And verbs are not the only lexical category whose arguments link. Adjectives like [$_A$ fond], prepositions like [$_P$ under], and nouns like [$_N$ perusal] all map their semantic arguments to syntactic positions. And many of these mappings are one-to-one.

(4) a. [$_{NP}$ Roz] is fond (of) [$_{NP}$ raspberries]
| |
fond: experiencer [theme]

b. under [$_{NP}$ the floorboards]
|
under: [theme]

c. [$_{NP}$ their] perusal of [$_{NP}$ the papers]
| |
perusal: agent [theme]

But the mapping is not always so straightforward. While the derived nominal in (4c) contains the same thematic structure as its underlying verb, Nominal Formation applies to the verb *organize* in (5a), suppressing the agent, to produce (5b). In the syntax, the agent is not expressed; it is either absent from the lexical representation altogether, as in (5b), or present but unlinked as in (5c), as shown by the possibility of an agentive adjective, like *voluntary*. Either way, there is a mismatch: the agent is not expressed syntactically but it is implicit – someone is doing the organizing. (Contrast (5c) with *the timing of fundraisers* with no implicit agent, and no possibility of an agentive adjective: * *the voluntary timing of fundraisers*)

(5) a. [$_{NP}$ Someone] voluntarily organizes [$_{NP}$ fundraisers].
| |
agent [theme]

b. the organizing of [$_{NP}$ fundraisers]
|
[theme]

c. the voluntary organizing of [$_{NP}$ fundraisers]
|
agent [theme]

Such mismatches between semantic arguments and their syntactic expressions are not only the product of lexical processes like Nominal Formation. For many underived forms, too, semantic arguments can – or must – outnumber syntactic positions. For example, *cook* (*read*, *paint*, *eat*) assigns two theta roles, agent and theme. The object can be omitted, as in (6b), but an implicit theme remains. Jack cooked something – even more specifically – some kind of food or a meal.

(6) a. [$_{NP}$ Jack] cooked [$_{NP}$ the eggplant]
| |
agent [theme]

b. [$_{NP}$ Jack] cooked.
|
agent [theme]

Cases like these have been one motivation for questioning theta grids and adopting a more articulated semantic representation, a full-blown Lexical Conceptual Structure, or LCS (Jackendoff, 1972 and later; Carrier-Duncan, 1985; Levin & Rapoport, 1988; Pinker, 1989).

Another motivation for a richer representation is that it can encode information that theta grids have no way to express. For example, in theta grid terms, the lexical process that attaches the English prefix *out-* (in *outsing, outrun*) takes a verb's theta grid and adds an internal theme, as in (7).[2]

(7) a. [$_{NP}$ The soprano] sang.
|
agent [ ]

b. [$_{NP}$ The alto] outsang [$_{NP}$ the soprano].
| |
agent [theme]

But *out-* also adds some meaning, roughly, "to surpass x in VERB-ing", which theta grids do not register.

Other arguments have been made for replacing theta grids with LCS, many of which focus on linking. Even before the term "theta grid" was coined for the array of semantic roles of a verb, Jackendoff (1972) noted that for verbs like *buy* and *sell* in (8) and (9), one syntactic NP, the subject, corresponds to two semantic roles. For *buy*, it is the agent and goal; for *sell*, the agent and source. (Underlining indicates the direct internal argument.)

(8) [$_{NP}$ John] bought [$_{NP}$ a goldfish] from [$_{NP}$ Mary]
| | |
buy: agent [goal theme source]

---

[2] This intransitive *sing* differs from transitive *sing* (*sing an aria*) which has a theme and does not accept the prefix and the additional theme argument: **The alto outsang the soprano (of) an aria*.

(9) [$_{\text{NP}}$ Mary] sold [$_{\text{NP}}$ a goldfish] to [$_{\text{NP}}$ John]
| | |
sell: agent [source theme goal]

The sentences can be paraphrased as in (10).

(10) a. John caused a goldfish to go from Mary to himself (in exchange for money).
b. Mary caused a goldfish to go from herself to John (in exchange for money).

Jackendoff used this double theta marking as an argument against Fillmore's (1968) Case Theory. Since Case Theory expressed thematic relations as D-Structure relations, it claimed that each argument of a verb can have one and only one thematic role. So *buy* and *sell* pose a serious problem. The same problem applies to theta grids. Because theta grids conflate the number of arguments of a verb with the particular theta roles that those arguments bear, each argument can have one and only one thematic role. Either (11a) or (11b) can be the theta grid for *buy*, but not (11c). Yet the information in (11c) has to be registered somewhere.

(11) a. agent [theme source]
b. goal [theme source]
c. agent / goal [theme source]

Further arguments for LCS come from other verb classes whose linking facts are not simply captured with theta grids. The reflexive verbs in (12), *wash* and other members of its class (*shave, dress, strip*) and the reciprocal verbs in (13), *meet* (*fight, kiss, embrace, wrestle*), can either link their theme or leave it implicit. But when these themes are not linked, as in (c), they must somehow be further specified to be interpreted as in (b), either coreferent with the subject (*wash*) or reciprocally bound to it (*meet*).

(12) a. [$_{\text{NP}}$ The unwashed] washed [$_{\text{NP}}$ the dishes]
b. [$_{\text{NP}}$ The unwashed]$_{\text{i}}$ washed [$_{\text{NP}}$ themselves]$_{\text{i}}$
c. [$_{\text{NP}}$ The unwashed] washed

d. [$_{\text{NP}}$ The unwashed] washed
|
wash: agent [theme]

(13) a. [$_{\text{NP}}$ Troilus and Cressida] met [$_{\text{NP}}$ someone]
b. [$_{\text{NP}}$ Troilus and Cressida]$_{\text{i}}$ met [$_{\text{NP}}$ each other]$_{\text{i}}$
c. [$_{\text{NP}}$ Troilus and Cressida] met

d. [$_{\text{NP}}$ Troilus and Cressida] met
|
meet: agent [theme]

Related to these are verbs, like *butter* in (14), with an “incorporated” argument, whose implicit argument is not **allowed** to link to a syntactic arguments, leading to a necessary mismatch in the number of theta roles and syntactic arguments. And here, too, the unlinked argument contains very specific information. If *x butters y* means something like x “puts butter (or some other buttery substance) on” y then *butter* (*powder, salt*) has an implicit theme, “butter or some other buttery substance” and this theme cannot be expressed as an argument: **The dairymaid buttered margarine onto the royal slice of bread.*

(14) [$_{NP}$ The dairymaid] buttered [$_{NP}$ the royal slice of bread]
| |
butter: agent [theme location]

For *bottle* in (15), and related verbs (*bag, pocket*), if *x bottles y* means “x puts y in bottles” then the implicit argument is the location, “in bottles”.[3]

(15) [$_{NP}$ Emilio] bottles [$_{NP}$ his own olive oil]
| |
bottle: agent [theme location]

Resultative verbs provide another example of a mismatch between a verb’s syntactic XPs and theta roles, but in the other direction.

(16) a. [$_{NP}$ The gardener] watered [$_{NP}$ the tulips] [$_{AP}$ flat].

b. [$_{NP}$ The joggers] ran [$_{NP}$ their Nikes] [$_{AP}$ threadbare].

Transitive resultatives like (16a) and intransitive resultatives like (16b) have the same number of syntactic constituents, yet the verbs have different numbers of theta roles. In (16a) the postverbal NP is an argument of resultative *water* and bears one of its three theta roles, as shown in (17a). In (16b) the postverbal NP is not an argument of the verb, as shown by many argumenthood tests (Carrier & Randall, 1992); semantically, the joggers did not run their Nikes. The two theta roles for resultative *run* are shown in (17b).

(17) a. agent [theme goal]

b. agent [goal]

So there are several types of linking patterns, schematically shown in (18). In addition to the one-to-one linkings in (1)–(4), there are mismatches in both directions: more semantic roles than syntactic arguments and the reverse, as illustrated in (18).

---

[3] Clark & Clark (1979) refer to these two classes as locatum and location verbs respectively. See also Jackendoff (1990).

(18)	(1) devour	(5c) organizing	(6) cook	(8) buy	(17b) run (resultative)
	(2) think	(14) butter	(12) wash	(9) sell	
	(4c) perusal	(15) bottle	(13) meet		
	XP	XP	XP (YP)	XP	XP YP
	|	|	| |	/\	|
	θ	θ θ	θ θ	θ θ	θ

Such "mismatches", these one-to-many or many-to-one linking patterns have been the motivation for questioning theta grids (or any other simple list of semantic roles) and for arguing for a more articulated semantic structure. Specifically, all of these cases pose a challenge to the Theta Criterion (Chomsky, 1981, 1986), in (19):[4]

(19) **Theta Criterion** (from Chomsky 1986:184)

a. Each argument is assigned its theta role in exactly one theta position (namely, at D-structure)

b. Each assignable theta role must be assigned to an argument

What is needed is a representation that obeys the Theta Criterion's one-to-one correspondence between arguments and thematic roles but can also encode syntactically unexpressed arguments, whether obligatorily or optionally absent, and handle the apparent mismatch between theta-roles and XPs in the resultatives in (16).

1.2 Representing Arguments and Satisfying the Theta Criterion

We will claim that the Theta Criterion holds, but not between a theta grid and the syntax. As outlined in the Introduction, we follow Jackendoff (1990) and others in assuming that thematic information is contained in a more articulated lexical Conceptual Structure, or (CS). Within a CS, those constituents that are "assignable" in the sense of (19b) are designated as linking to the syntax. In Jackendoff's (1990) notation, the CS for the verb *bottle* in (15) is shown in (20), with two linking theta roles, indicated with subscripts, the agent, i, and the theme, j:

(20) $[_{\text{EVENT}}\ \text{CAUSE}\ ([_{\text{THING}}\ \ ]_i,\ [_{\text{EVENT}}\ \text{GO}\ ([_{\text{THING}}\ \ ]_j,\ [_{\text{PATH}}\ \text{TO}\ ([_{\text{PLACE}}\ \text{IN}\ (\ [_{\text{THING}}\ \text{<BOTTLE>}]\ )\ ]\ )\ ]\ )\ ]\ )\ ]$

---

[4] Chomsky states that this formulation might be too strong: "Instead of requiring a one-to-one relation between theta positions and chains containing them, we require only a one-to-one relation between theta positions and chains that they theta mark, assuming now that a chain is theta marked by the element in its final position." Since this refinement does not affect our argument, we will ignore it here.

But not all of the CS constituents link; *bottle* has one implicit CS argument, indicated in angled brackets. Under this view, the Theta Criterion holds between the **designated** CS arguments and the syntax, as in (21).[5]

(21) syntax DS [. . . XP . . . YP . . .]
----
lexicon *verb* CS [. . . x_i . . . y . . . z_j . . .]

Subscripts are the standard way to designate which CS elements link and the subscripts in (20) are easy to identify. However, subscripts are also used to co-index CS constituents with each other. In (22), transitive *wash* has two linking THING constituents. But in (23), *wash* appears without an object, and its reflexive interpretation is indicated by coindexing.

(22) DS: $[_{NP}$ John] washed $[_{NP}$ the dog]
wash CS: $[_{EVENT}$ CAUSE ($([_{THING}$]), [BECOME ($([_{THING}$]), $[_{PLACE}$ <CLEAN>])])]

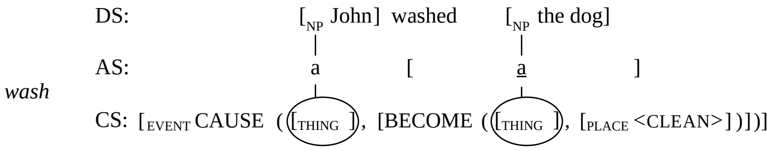
(23) DS: $[_{NP}$ John] washed
wash CS: $[_{EVENT}$ CAUSE ($([_{THING}\ ]_i)$, [BECOME ($[_{THING}\ ]_i$, $[_{PLACE}$ <CLEAN>])])]

To distinguish linking from such coindexing, we will reserve subscripts for coindexing and introduce a new, somewhat unconventional, notation for linking, *circling* each CS element that links. And we will make one other addition to our representations, for clarity, an innovation that we previewed in the Introduction. Though the arguments of each head **can** be read directly from its CS and their syntactic positions can be determined from D-structure, we will extract these elements in a more “reader-friendly” way, on a separate “argument structure” (AS) line, as shown for (22) and (23) in (24) and (25), respectively. The *a* outside the brackets is the external argument; the *a* inside is the internal argument. One other distinction is made in most approaches that represent AS, between “direct” and “indirect” internal arguments, by marking the direct internal argument with underlining, as in (24). We will be arguing in Chapter 2 that this distinction should be done away with, and so for the rest of this chapter, we will dispense with it.

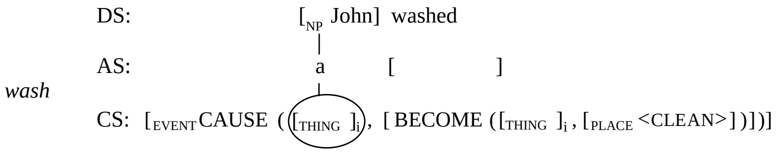
---

[5] Here we are using the classical terminology of GB which postulates a level of syntactic structure, DS, as the entry point to the syntax. In the contemporary Minimalist Program, DS should be understood as containing the lexical elements available in the numeration to build syntactic structure. In this sense, our DS is just a projection of lexical properties.

(24)


DS: [NP John] washed [NP the dog]
AS: a [a]
wash
CS: [EVENT CAUSE ([THING], [BECOME ([THING], [PLACE <CLEAN>])])]

(25)


DS: [NP John] washed
AS: a [ ]
wash
CS: [EVENT CAUSE ([THING]i, [BECOME ([THING]i, [PLACE <CLEAN>])])]

Using this notation, since AS is the projection of the arguments in a CS that are designated to link, we now can restate the Theta Criterion as in (26) as a principle that holds between the arguments at AS and the syntax.

(26) **Theta Criterion**
Within the argument structure of a predicate,
a. each argument must thematically license one and only one syntactic constituent and
b. a syntactic constituent may saturate one and only one argument

Note that (26) governs the mapping of the **arguments** of a predicate (a V, N, or A head). But it says nothing about adjuncts. And it is formulated in terms of predicates: it allows one syntactic constituent to correspond to one thematic role of a given predicate but to more than one thematic role if they are assigned by different predicates. (This situation will be illustrated in Chapter 5, by transitive resultatives.)[6] Thus every *a* in AS is an argument of its head. In contrast to these linking CS constituents, non-linking CS constituents are not projected to AS and do not correspond to XPs in DS.

One other convention must be made explicit, so that the Theta Criterion does not rule out grammatical cases like (25), where the coindexed THING should not count as a violation.

(27) **Bound Argument Condition**:
Given two bound CS arguments, only the higher one is eligible to link to an AS position.

Notice that (27) states not only that only one of two coindexed elements can link, it says that the one that links is the *higher one*, a generalization first pointed out by Carrier-Duncan (1985), who proposed the convention for English and Tagalog. We will see below that it is true for a number of verb classes.

---

[6] This modification (sometimes called a "relativized" Theta Criterion) has been argued for in Schein (1982), Emonds (1985) and Rapoport (1986). This version is adapted from Samek-Lodovici (2003).

With the Theta Criterion constraining the relation between just those thematic roles that are syntactically expressed (and therefore appear in AS) and the syntax, it imposes no requirements on the implicit thematic roles that are not expressed as arguments, *including* the subset of them that get expressed as syntactic adjuncts. As we will see below, it is something else – not the Theta Criterion – that prevents one theta role from corresponding to two syntactic XPs, one an argument and one an adjunct.

Though we will put off discussing AS further until later in this chapter, it should be clear by now that AS is not a separate level of representation. It is rather an interface where syntactically relevant CS information is registered, displaying a head's syntactic argument positions – internal or external – that its designated CS arguments link to. We will return to this shortly. Before doing so, though, we will lay out our assumptions about Conceptual Structures: what they are made of and how they are built up compositionally.

1.3 Building Conceptual Structure Representations

1.3.1 Argument Fusion and Selection

Our view of CS derives directly from the work of Jackendoff (1983, 1987, 1990) with certain differences, which we will point out as they arise. Jackendoff (1987) proposes that the CS of a verb is composed from a universal set of primitive functions such as CAUSE, GO, STAY, and BE. Each function, together with its arguments, forms a Conceptual Structure clause (not to be confused with "clause" in the syntactic sense). CAUSE, GO and STAY head CS clauses expressing events. BE heads a CS clause expressing a state. The arguments of these primitive functions are THINGS, PLACES, or PATHS. PLACE and PATH are further decomposed into a function such as AT, IN, or TO plus an argument. Note that THINGS can be either concrete entities, like people (*Fred*), objects (*crates*), or stuff (*lettuce*), or abstract entities, like concepts (*sincerity*) or states (*flat, angry, blue*).

Consider the sentence in (28).

(28) The books are in crates.

The verb *be* is unaccusative, with the DS in (29). Its CS expresses a state of affairs involving two arguments: a THING and a LOCATION. These are listed in AS and correspond to the verb's two syntactic arguments, NP and PP.[7]

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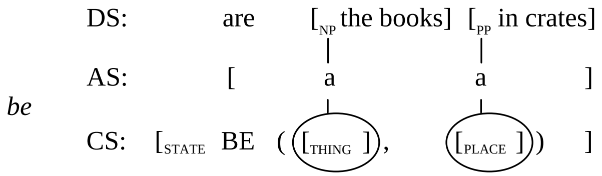
[7] The CSs that we are introducing here for unaccusative verbs like *be* will be modified in Chapters 3 and 7, after we lay out various aspects of our theory of linking.

(29)



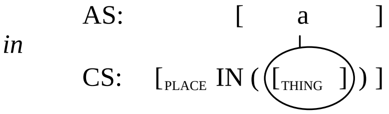
To represent the meaning of (28), the CS for *be* must be combined with the CSs of the other elements in the sentence, compositionally, in a process called "**fusion**" (adapted from Jackendoff, 1987, 1990). Argument Fusion is stated in (30):

(30) **Argument Fusion**:
For each argument position, *a*, in the argument structure of a head, *H*, (a verb, preposition, noun, or adjective), fuse the Conceptual Structure of the syntactic XP that satisfies *a* into the constituent in the CS that *a* links to.

Fusion combines CSs into progressively larger and larger phrases until the CS of the entire sentence is built up. We will not attempt to provide CSs for *the*, *books*, or *crates*; small capitals will stand in for them.

There is one other head in (28), the preposition *in*. Its CS, shown in (31), involves one THING argument.

(31)



It fuses with the CS of the NP *crates*, a THING, with the result in (32).

(32) [$_{\text{PLACE}}$ IN ([$_{\text{THING}}$ CRATES])]

Fusion can then combine this CS with the CS of *be*. The CS of *in crates* fuses with the PLACE position and the CS of *the books* fuses with the THING position. The result is (33).

(33) [$_{\text{STATE}}$ BE ([$_{\text{THING}}$ THE BOOKS] , [$_{\text{PLACE}}$ IN ([$_{\text{THING}}$ CRATES])])]

Notice that the PLACE requirement in the CS of *be* could be satisfied by other PLACE functions. For example, if the PP were *at the door*, the CS for *at* would be (34) and the sentence *the books are at the door* would be represented as in (35).

(34) [$_{\text{PLACE}}$ AT ([$_{\text{THING}}$])]

(35) [$_{\text{STATE}}$ BE ([$_{\text{THING}}$ THE BOOKS] , [$_{\text{PLACE}}$ AT ([$_{\text{THING}}$ THE DOOR])])]

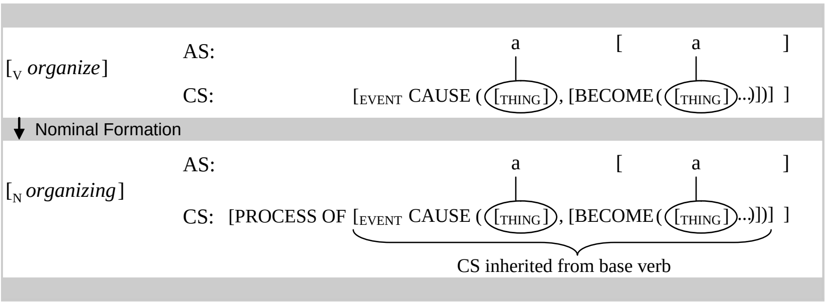
But some prepositions are impossible with *be* because their CSs are PATHs, not PLACEs, such as *to* and *into*, in (36). The CS for *to*, in (37), cannot fuse with the CS of the verb because of this mismatch. This matching between the CS of the verb and the CS of its argument is how **selectional restrictions** are encoded.

(36) a. *The books are to crates.
b. *The books are into crates.

(37) *to*: $[_{\text{PATH}}$ TO ($[_{\text{THING}}$])]

Fusion works similarly in building up the CS representations of nominals. As shown in (38), to form a nominal like *the organizing of fundraisers* (from (5b)), a lexical rule, Nominal Formation (NF), applies to the CS of the underlying verb, *organize*:

(38)


[V organize]
AS: a [a]
CS: [EVENT CAUSE ([THING], [BECOME ([THING]...)])]]
Nominal Formation
[N organizing]
AS: a [a]
CS: [PROCESS OF [EVENT CAUSE ([THING], [BECOME ([THING]...)])]]
CS inherited from base verb

The output CS of *organizing* means something like "the act or process of causing a thing to come to be in an organized state". Notice that although the external argument in the AS of the base verb is absent from the AS of the derived nominal, the agent in the CS that it was linked to persists. This explains why there is an understood or implicit agent in the nominal.

Once the NP *fundraisers* is constructed by fusion, it can fuse with a $[_{\text{THING}}$] position in the CS of *organizing*. The resulting CS is (39).

(39) CS: $[_{\text{ACTION}}[_{\text{EVENT}}$ CAUSE($[_{\text{THING}}$], [BECOME ($[_{\text{THING}}$ FUNDRAISERS], $[_{\text{PLACE}}$ < ORGANIZED>])])]]

As above, this NP can itself be an argument of a verb or a preposition.

(40) a. They discussed *the organizing of fundraisers*.
b. We talked about *the organizing of fundraisers*.

In all of the cases we have seen so far, smaller CSs fuse with ever larger CSs by being embedded inside them. Not all fusion is simple embedding, however, as we will see when we turn to resultatives, in Chapter 5.[8]

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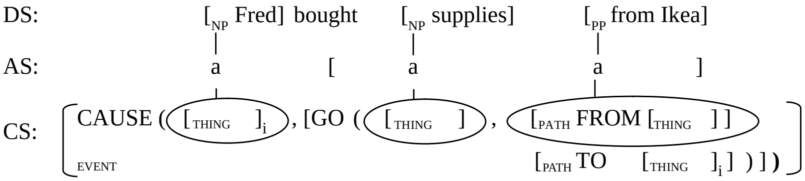
[8] This conception of Nominal Formation, according to which verbs and nominals share a core part of CS, naturally relates to recent syntactic proposals (working in the Distributed Morphology framework) in which these two categories share a root underspecified for category, which gets

1.3.2 *Constraining Fusion: The Prohibition Against Double Fusion*

Let us now turn to a case of fusion involving a verb with an implicit argument, such as *buy* in (41), repeated from (8), above. In this sentence, *buy*'s three syntactic arguments correspond to its THING agent, THING theme, and a PATH, which is composed of a function FROM and a THING. The fourth CS THING argument is implicit, coindexed with the agent.[9]

(41)


DS:
[NP Fred] bought
[NP supplies]
[PP from Ikea]
AS:
a
[
a
a
]
CS:
CAUSE ([THING]i , [GO ([THING] , [PATH FROM [THING]]
EVENT
[PATH TO [THING]i])])

The CS of *Fred* fuses with the agent position in (41) and, in addition, with the position coindexed with it. This is how *Fred* comes to be interpreted as both the agent and the goal of the verb.[10] The CS of *supplies* fuses with the theme position. The output so far is (42).

(42)
$$\left[\begin{array}{l} \text{CAUSE ([}_{\text{THING}}\text{ FRED]}_i\text{, [GO ([}_{\text{THING}}\text{ SUPPLIES], [}_{\text{PATH}}\text{ FROM [}_{\text{THING}}\quad\text{]]} \\ _{\text{EVENT}} \qquad\qquad\qquad\qquad\qquad\qquad \text{[}_{\text{PATH}}\text{ TO}\quad\text{[}_{\text{THING}}\text{ FRED]}_i\text{])])} \end{array}\right]$$

In order to fuse the CS of the PP argument *from Ikea* with the CS of *buy*, fusion first applies in the CS of the PP itself:

(43) *from*: $[_{\text{PATH}}\ \text{FROM ([}_{\text{THING}}\ \text{IKEA])]}$

This CS can then fuse with the CS of the verb, yielding (44).

(44)
$$[_{\text{EVENT}}\ \text{CAUSE ([}_{\text{THING}}\text{ FRED]}_i\text{ , [GO ([}_{\text{THING}}\text{ SUPPLIES] , [}_{\text{PATH}}\text{ FROM [}_{\text{THING}}\text{ IKEA]]}$$
$$[_{\text{PATH}}\ \text{TO}\quad[_{\text{THING}}\ \text{FRED]}_i\text{])])]}$$

But now there is a problem. Consider (45), which expresses the source overtly in a *to*-PP, with the second coindexed *Fred* translated into an anaphor.

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defined by the morpheme that the root attaches to. (See Halle and Marantz, 1993,1994; Harley, 1995; and Alexiadou, 2001).

[9] For simplicity, we are ignoring the simultaneous transfer of money from Fred to Ikea.

[10] Notice that this coindexing does not violate the Theta Criterion. There is still a one-to-one mapping between one NP, *Fred*, and one argument *a*, a projection of one linking CS constituent.

(45) *[$_{NP}$ Fred] bought [$_{NP}$ supplies] [$_{PP}$ from Ikea] [$_{PP}$ to himself]

Why is this sentence ungrammatical? The CS of *to*, headed by TO, must fuse with the PATH in the lower line of the CS of the verb. But this PATH already has the CS of *Fred* fused with it:

(46) *to*: [$_{PATH}$ TO ([$_{THING}$ FRED])]

And so far, there is no principle to block a constituent from fusing with a CS position that has already been fused with. It is not a Theta Criterion violation, since the subject NP corresponds to the agent and the PP, to the goal. We propose that the problem, which we will call "double fusion", is ruled out by (47).

(47) **Prohibition Against Double Fusion**
Fusion cannot apply more than once to a CS constituent.

The Prohibition Against Double Fusion (PADF) is a general prohibition against fusing the CSs of two syntactic XPs with the same CS constituent. Once a constituent has fused with a CS argument position, no other constituent can fuse with it.

We will see other cases where the PADF rules out double fusion as we look at more classes of verbs. One example we will consider is in (48).

(48) a. *[$_{NP}$ Insects] devoured the trees [$_{PP}$ by carpenter ants].
b. *[$_{NP}$ Insects] [$_{NP}$ carpenter ants] devoured the trees.
c. The trees were devoured [$_{PP}$ by carpenter ants].
d. *The trees were devoured [$_{PP}$ by sincerity].

Example (48b) is blocked by the Theta Criterion because there are two arguments vying for the sole agent position of *devour*. However, in (48a) the agent is in a PP [*by carpenter ants*] and it is an adjunct, not an argument, so the Theta Criterion does not apply to it and cannot rule it out. We will postpone the details of how *by*-phrase adjuncts fuse in the CS of a sentence, but (48c,d) show that they must fuse with the agent position, which imposes selectional restrictions on them. Since the same mechanism will apply in (48a), it must be the PADF that is blocking it.

Another case that we will look at is (49).

(49) a. *They loaded lettuce onto the wagon [$_{PP}$ with romaine].
b. They loaded the wagon [$_{PP}$ with romaine].
c. *They loaded the wagon [$_{PP}$ with sincerity].

With-PPs as in (49b) are also adjuncts and, as such, are not regulated by the Theta Criterion. As we will examine in detail below, they fuse with the theme position the verb's CS, which accounts for their selection (compare (49b) with the ungrammatical (49c)). In (49a), the theme [*romaine*] in the *with*-PP satisfies the selectional requirements on the theme, but is prevented by the PADF from fusing with the position already occupied by the CS of the argument [*lettuce*].

We will have more to say about the PADF in Chapter 6, where we look at more complex cases of fusion, including those involving “clausal” fusion. For now, we will just take the PADF as a general constraint on how fusion operates.

1.4 Streamlining the Set of CS Primitives

Let us return to our inventory of CS primitives. We have already seen how a limited set of CS functions combine to produce a wide range of verbs and to impose selectional restrictions on their arguments. With the goal of keeping the number of primitives to a minimum, we will now turn to some others that have been proposed, to see which ones are actually necessary.

The primitive function BE appears in the CSs of many verbs that express the state of being in a location, such as (stative) *stand* and *sit* (e.g., *the books stood on the shelf*).[11] For verbs that express a *change* of location, Jackendoff proposes an additional primitive function, GO. GO takes two arguments, a THING and a PATH. The PATH is headed by either a TO or FROM function, depending on the direction of motion. Jackendoff’s prototypical English GO verb, *go*, has the CS in (50). The CSs of other change-of-location verbs (eg., intransitive *get, travel, enter, leave, come*) are variations on this basic CS.

(50) AS: [a a]
go
CS: $[_{\text{EVENT}}\ \text{GO}\ (\ [_{\text{THING}}\ ],\ \ [_{\text{PATH}}\ \text{TO}\ (\ [\ \ ]\ )]\ \ )]$

For Jackendoff, the CS of a sentence containing *go*, such as (51), is constructed compositionally, beginning with the CS of the PP headed by *to* in (52).

(51) The books went to Boston.

(52) AS: [a]
to
CS: $[_{\text{PATH}}\ \text{TO}\ (\ \ [_{\text{THING}}\ ]\ \ )\ ]$

The CS of *Boston* fuses with the THING position in the CS of *to*, which can then fuse with the PATH in the CS of *go* in (50). The CS of go’s other argument, the NP, *the books*, fuses with the THING position. The resulting CS is (53).[12]

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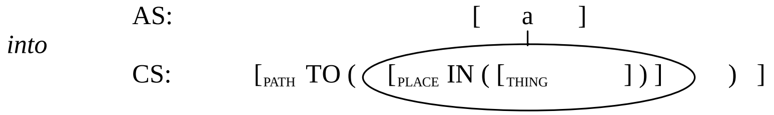
[11] These verbs may impose additional specifications. For example, *stand* requires IN AN UPRIGHT MANNER.

[12] In Chapter 2, we will justify the claim that the PP and not the NP inside it is the argument of the verb.

(53) [$_{\text{EVENT}}$ GO ([$_{\text{THING}}$ THE BOOKS] , [$_{\text{PATH}}$ TO ([$_{\text{THING}}$ BOSTON])])]

A more complex case involves the preposition *into*, whose CS is in (54). Here, the same PATH function, TO, takes as its argument not a THING (*Boston*) but a PLACE function, IN, which, in turn, takes a THING (*crates*). For the sentence in (55a), the result after fusion is in (55).

(54)


into
AS: [a]
CS: [$_{\text{PATH}}$ TO ([$_{\text{PLACE}}$ IN ([$_{\text{THING}}$])])]

(55) a. The books went into crates.

b. [$_{\text{EVENT}}$ GO ([$_{\text{THING}}$ THE BOOKS], [$_{\text{PATH}}$ TO ([$_{\text{PLACE}}$ IN ([$_{\text{THING}}$ CRATES])])])]

Jackendoff's proposal to add GO to the inventory of primitives is controversial, and we think, unnecessary. In our second departure from Jackendoff, we take the position of Dowty (1979) that change-of-location verbs should be represented with a variant of BE that means "come to be". Jackendoff already has such a primitive, called INCHOATIVE BE, or INCH BE, for events that terminate in states, such as *wash* in *John washed the dog* from (22) above, and *stand* in *Bill quickly stood on the table*. If we characterize the GO cases, *x goes to y*, as "X COMEs to BE at y" then INCH BE naturally extends to them. The primitive GO in (56a) would be written as in (56b).

(56) a. [$_{\text{EVENT}}$ GO ([$_{\text{THING}}$] , ...

b. [$_{\text{EVENT}}$ INCH ([$_{\text{STATE}}$ BE ([$_{\text{THING}}$] , ...

We will make this extension and at the same time simplify our notation by using a more transparent label, BECOME, as in (57). Bear in mind, though, that this is only a shorthand for an event that terminates in a state; the [$_{\text{STATE}}$] inside is implied. [13]

(57) [$_{\text{EVENT}}$ BECOME ([$_{\text{THING}}$] , ...

Making this move allows one more simplification: we can now eliminate the primitive PATH, replacing it with a combination of BECOME and PLACE.[14] The CS for *go* in (50) translates into (58). The CS for *to* in (52) translates into (59). (53), the

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[13] The primitive BECOME should not be confused with the English word *become*. BECOME can be used wherever the phrase "come to be" can be used, though *become* cannot: *The books came to be at the door*; **The books became at the door*.

[14] Jackendoff (1990, 93–95) argues against reducing all GOs to BECOME (in his system, INCHoative BE). We will deal only with cases involving *to/into/onto*, events of coming to be at a place. We will not take a stand on the other cases.

CS for (51), *the books went to Boston*, is now represented as (60) and (55b), the CS for *the books went into crates*, is now (61).[15]

(58) *go*: $[_{\text{EVENT}}\ \text{BECOME}\ (\ [_{\text{THING}}\ ]\ ,\ [_{\text{PLACE}}\ \text{AT}\ (\ [\ \ ]\ )\ ]\ )\ ]$

(59) *to*: $[_{\text{PLACE}}\ \text{AT}\ (\ [_{\text{THING}}\ ]\ )\ ]$

(60) $[_{\text{EVENT}}\ \text{BECOME}\ (\ [_{\text{THING}}\ \text{THE BOOKS}]\ ,\ [_{\text{PLACE}}\ \text{AT}\ (\ [_{\text{THING}}\ \text{BOSTON}]\ )\ ]\ )\ ]$

(61) $[_{\text{EVENT}}\ \text{BECOME}\ (\ [_{\text{THING}}\ \text{THE BOOKS}]\ ,\ [_{\text{PLACE}}\ \text{AT}\ (\ [_{\text{PLACE}}\ \text{IN}\ ([_{\text{THING}}\ \text{CRATES}]\ )\ ]\ )\ ]\ )\ ]$

With these simplifications comes an interesting parallel. Recall that in (34), repeated here, *at* is represented as $[_{\text{PLACE}}\ \text{AT}\ ([_{\text{THING}}\ ])\ ]$. But this is the same CS that we have just assigned to to in (59). How can these prepositions be distinguished?

(34) $[_{\text{PLACE}}\ \text{AT}\ (\ [_{\text{THING}}\ \ \ ]\ )\ ]$

(35) $[_{\text{STATE}}\ \text{BE}\ (\ [_{\text{THING}}\ \text{THE BOOKS}]\ ,\ [_{\text{PLACE}}\ \text{AT}\ (\ [_{\text{THING}}\ \text{THE DOOR}]\ )\ ]\ )\ ]$

Recall that in a sentence like *the books are at the door*, with the CS in (35), above, the PLACE CS in (34) is fusing with a CS headed by BE. In *the books went to Boston*, with the CS in (60), the same PLACE CS is fusing with a CS headed by BECOME. The difference between *at* and *to*, then, falls out from what the PLACE CS is fusing with.[16]

Having eliminated the two CS primitive categories GO and PATH, preposition selection is no longer a consequence of GO versus BE or PATH versus PLACE. Now the difference straight forwardly follows from BE versus BECOME, as summarized in (62).[17]

(62)

BE	BECOME
The books are *at the door*	The books went *to Boston*.
The books are *in crates*.	The books went *into crates*.
The books are *on shelves*.	The books went *onto shelves*.

---

[15] As a reviewer points out, these refinements do not lead to a theoretically simpler CS, only one which has fewer primitives. However, they will also play a role in our analysis of resultatives in Chapter 5. And we will give more arguments for them in Chapter 10, Section 3.

[16] At this point, *to* and *at* have identical CS representations, distinguished only by the CS function that they occur with: *to* with BECOME and *at* with BE. These representations will be slightly modified after we introduce Clausal Fusion in Chapter 5.

[17] *Into* and *onto* unambiguously express a change of location/state and so can occur only with BECOME verbs. But Jackendoff (1983) notes that *in* and *on* can express either a location/state or a change of location/state, so they can appear with BE, as in (i), or with BECOME verbs like *put*, as in (ii). With *put*, we find *into* preferable.

(i) BE The book is in/*into the box.
(ii) BECOME She put the book ?in/into the box.

This proposal has much in common with Harley (1995, 1998, and later) in which primitives similar to our BE and BECOME are combined to produce a systematic array of basic verb meanings.

The CSs of causative verbs, such as *put* in (63), are more complex. Their highest CS function, CAUSE, takes a THING as its first argument. But its second argument is not a PLACE; it is an entire CS clause. This clause, like our CS for *go*, is headed by BECOME, and it can be paraphrased as “cause something to come to be at a new location”.

(63) a. $[_{\text{NP}}$ Sue] put $[_{\text{NP}}$ the books] $[_{\text{PP}}$ into crates]
b. *put*: $[_{\text{EVENT}}$ CAUSE ($[_{\text{THING}}$], $[_{\text{EVENT}}$ BECOME ($[_{\text{THING}}$], $[_{\text{PLACE}}$ AT($[_{\text{PLACE}}$])])])]

But *put* is more restrictive than *go*. It allows prepositions that incorporate the meaning of *to*, like *into* or *onto* but not *to* itself: **She put the books to Boston*. So this means (adapting Jackendoff’s 1987 proposal) that *put*’s PLACE function AT, unlike the PLACE function for *at*, cannot take a THING. It must take another PLACE function. This inner PLACE function is unspecified (hence the dots in (63b)), and is filled in with the CS of whatever preposition is chosen. For example, the CS of *into*, in (64), will supply IN.

(64) *into* $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ IN ($[_{\text{THING}}$])])]

The CS for (63a) is constructed compositionally. To construct the CS for the PP, the CS of *crates* fuses with the THING position in the CS of *into*, as in (65). Then this CS, and the CSs of *put*’s other arguments, fuse with the PLACE and THING positions in the CS for *put*, as in (66).[18]

(65) $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ IN ($[_{\text{THING}}$ CRATES])])]

(66) $[_{\text{EVENT}}$ CAUSE ($[_{\text{THING}}$ SUE], $[_{\text{EVENT}}$ BECOME ($[_{\text{THING}}$ THE BOOKS], $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ IN ($[_{\text{THING}}$ CRATES])])])])])]

The CSs of other prepositions will be compatible with the PLACE in the CS of *put* if they contain a PLACE containing another PLACE, what we will call a “complex” place. The internal PLACEs can then either take a THING, or not:

(67) a. *onto*: $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ ON $[_{\text{THING}}$]])]
b. *under*: $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ UNDER $[_{\text{THING}}$]])]
c. *inside*: $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ INSIDE])]
d. *nearby*: $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ NEARBY])]

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[18] We are making a minor departure from Jackendoff in using a slightly less complicated PLACE for *put*.

However, a PP whose CS is a “simple” PLACE, containing just a THING, like *to* in (68), will cause a conflict, as shown in (69).

(68) *to*: $[_{\text{PLACE}}$ AT ($[_{\text{THING}}$])]

(69) *$[_{\text{NP}}$ Sue] put $[_{\text{NP}}$ the books] $[_{\text{PP}}$ to crates].

As Jackendoff (1990) notes, some location prepositions, like *under* and *with*, have both a simple and a complex PLACE reading. They are compatible with *be* in (70) and with *put* in (71).

(70) a. The brochure is under the mat.
b. The brochure is with the magazines.

(71) a. She put the brochure under the mat.
b. She put the brochure with the magazines.

These prepositions have two representations, as shown for *under* in (72). *Be* selects (72a), *put* selects (72b).[19]

(72) a. *under*: $[_{\text{PLACE}}$ UNDER $[_{\text{THING}}$]]
b. *under*: $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$ UNDER $[_{\text{THING}}$]])]

Not all causative verbs are like *put*. As shown in (74) and (75), *attach* selects a simple PLACE; it allows *to* but not *onto* or *on*. And causative *get* and *move* allow either a simple or a complex PLACE. Like the BECOME verbs *get* and *go*, above, their PLACE is underspecified.

(73) a. *Sue put the books to Boston.
b. Sue put the books into crates.

(74) a. Noa attached the sail to the mast.
b. *Noa attached the sail onto/on the mast.

(75) a. Sue got/moved the books to Boston.
b. Sue got/moved the books into crates.

This 3-way contrast follows from the internal structure of the PLACE constituent in the verbs, as shown in (76). The CS of *put* specifies that its PLACE contain another PLACE. The CS of *attach* specifies that its PLACE take a THING. The CSs of *get* and *move* say nothing at all about the internal structure of their PLACE.

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[19] Here, again, we differ from Jackendoff (1990), who attributes this ambiguity to *put*, claiming that it can link either its outer PLACE (PATH, for him) or its inner PLACE. For us it comes from ambiguity in the prepositions and will fall out from how fusion works, as discussed in Chapter 4, Section 2.3.1.

(76) a. *put*: $[_{\text{EVENT}}$ CAUSE ($[_{\text{THING}}$], $[_{\text{EVENT}}$ BECOME ($[_{\text{THING}}$], $[_{\text{PLACE}}$ AT ($[_{\text{PLACE}}$])])])]
b. *attach*: $[_{\text{EVENT}}$ CAUSE ($[_{\text{THING}}$], $[_{\text{EVENT}}$ BECOME ($[_{\text{THING}}$], $[_{\text{PLACE}}$ AT ($[_{\text{THING}}$])])])]
c. *get/move*: $[_{\text{EVENT}}$ CAUSE ($[_{\text{THING}}$], $[_{\text{EVENT}}$ BECOME ($[_{\text{THING}}$], $[_{\text{PLACE}}$ AT ([ ])])])]

The chart in (77) summarizes how verbs select prepositions by specifying the internal structure of their PLACE. BE verbs (*be*) take a simple PLACE function headed by AT (*at the door*), IN (*in Boston*), ON (*on shelves*). BECOME verbs (*go, get*) have an underspecified PLACE; they can take either a simple PLACE function containing AT plus a THING (*to Boston, to the door*) or a complex PLACE function, containing AT plus another PLACE which takes a THING (*into crates, onto shelves*). Some BECOME verbs restrict their PLACE. *Put* requires that its PLACE contain another PLACE (*into crates*) not a THING (**to Boston*). *Attach* requires that its PLACE contain a THING (*to the mast*), not a PLACE (**onto the mast*). Others (*get, move*) allow either. Some prepositions (*under, with*) have two readings and are compatible with either a simple or complex PLACE. So it is different CS specifications, together with the type of predicate (BE or BECOME), that translate into the range of prepositions that we find with each verb.[20] A sample of these is shown in (77).

(77)

CS function		"Simple" PLACE: $[_{\text{PLACE}}$ ··· $[_{\text{THING}}$]]	"Complex" PLACE: $[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ ···]]
BE			
be	*at* NP	$[_{\text{PLACE}}$ AT $[_{\text{THING}}$]]	
	in NP	$[_{\text{PLACE}}$ IN $[_{\text{THING}}$]]	
	under NP	$[_{\text{PLACE}}$ UNDER $[_{\text{THING}}$]]	
	with NP	$[_{\text{PLACE}}$ WITH $[_{\text{THING}}$]]	
BECOME			
go/get/move	*to* NP	$[_{\text{PLACE}}$ AT $[_{\text{THING}}$]]	
	into NP		$[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ IN $[_{\text{THING}}$]]]
	under NP		$[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ UNDER $[_{\text{THING}}$]]]
CAUSE-BECOME			
attach NP	*to* NP	$[_{\text{PLACE}}$ AT $[_{\text{THING}}$]]	
	under NP	$[_{\text{PLACE}}$ UNDER $[_{\text{THING}}$]]	
put NP	*into* NP		$[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ IN $[_{\text{THING}}$]]]
	under NP		$[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ UNDER $[_{\text{THING}}$]]]
	with NP		$[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ WITH $[_{\text{THING}}$]]]
get/move NP	*to* NP	$[_{\text{PLACE}}$ AT $[_{\text{THING}}$]]	
	into NP		$[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ IN $[_{\text{THING}}$]]]

We will make one more change to Jackendoff's inventory of CS primitives. CSs of verbs with sources (like *detach* and *buy*) are nearly identical to the CSs of verbs with goals (*attach* and *sell*), but the motion is away from, not toward, something.

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[20] In addition to PPs like *inside the house*, we find single word PPs like *inside* or *downstairs*. These would be represented as $[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ INSIDE]] or $[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ DOWNSTAIRS]] with no THING inside the inner PLACE. They are compatible with *go*, *put* and *get*. We are not discussing the CSs of particles.

(78) a. Noa detached the sail from the mast.
b. Fred buys supplies from Ikea.

Jackendoff encodes *from* with its own primitive function FROM, as in (79).

(79) $[_{\text{EVENT}}\ \text{CAUSE}\ (\ [_{\text{THING}}\ \ ],\ [_{\text{EVENT}}\ \text{GO}\ (\ [_{\text{THING}}\ \ ],\ [_{\text{PLACE}}\ \text{FROM}\ (\ [_{\text{THING}}\ ]\ )\ ]\ )\ ]\ )\ ]$

Since we now represent change-of-location CSs with [BECOME . . . AT] instead of GO, we can represent *detach* by modifying our CS for *attach* in (80a), negating the PLACE function.

(80) a. *attach*: $[_{\text{EVENT}}\ \text{CAUSE}\ (\ [_{\text{THING}}\ \ ],\ [_{\text{EVENT}}\ \text{BECOME}\ (\ [_{\text{THING}}\ \ ],\ [_{\text{PLACE}}\ \text{AT}\ (\ [_{\text{THING}}\ \ ]\ )]\ \ )]\ \ )$

b. *detach*: $[_{\text{EVENT}}\ \text{CAUSE}\ (\ [_{\text{THING}}\ \ ],\ [_{\text{EVENT}}\ \text{BECOME}\ (\ [_{\text{THING}}\ \ ],\ \text{NOT}\ [_{\text{PLACE}}\ \text{AT}\ (\ [_{\text{THING}}\ \ ]\ )]\ \ )]\ \ )$

Now (78a) is represented as "Noa caused the sail to be not at the mast". We do not need the primitive FROM. Other verbs of this type are *remove, disconnect* and *unscrew*.

CS clauses headed by the primitives BE, BECOME, and CAUSE, actually account for a substantial portion of the lexicon. The corresponding verbs we have seen so far, *be, go, get, attach*, and *put*, are all "location" verbs. Their first argument is, or comes to be, at the location designated by their PLACE. But as originally argued by Gruber (1976) and Jackendoff (1972, 1983, 1990), these primitive predicates can function in different semantic fields. For example, as shown in (81), many of these verbs (*be, go*, and *get*) also have "state" readings. And just as *put* has *only* a location reading, there are verbs with *only* a state reading, like *make* and *render*.

(81)

	location (= concrete PLACE)	state (= abstract PLACE)
BE	The books were in crates.	The books are black /in a state of disrepair.
BECOME	The books went/got into crates. The car turned/got into the driveway.	The books went/got/turned black. The mixture went/got/turned into a liquid.
CAUSE-BECOME	She turned/got the car into the driveway. She put/got the books into crates.	She rendered/made/got/turned the books black. She rendered/made/got/turned the gas into a liquid.

Since states are nothing more than abstract PLACEs, location and state CSs can be represented identically except for their PLACE, which is either concrete, (c), or abstract, (a). In (82), a subscript, "c" or "a", distinguishes the outer PLACE in the CSs for *put* and *make*.

(82) a. *put*: $[_{\text{EVENT}}\ \text{CAUSE}\ \ (\ [_{\text{THING}}\ \ ]\ ,\ [_{\text{EVENT}}\ \text{BECOME}\ (\ [_{\text{THING}}\ ],\ [_{\text{PLACE-c}}\ \text{AT}\ (\ [_{\text{PLACE}}\ \ ]\ )]\ )\ ]\ )]$

b. *make*: $[_{\text{EVENT}}\ \text{CAUSE}\ \ (\ [_{\text{THING}}\ \ ]\ ,\ [_{\text{EVENT}}\ \text{BECOME}\ (\ [_{\text{THING}}\ ],\ [_{\text{PLACE-a}}\ \text{AT}\ (\ [_{\text{PLACE}}\ \ ]\ )]\ )\ ]\ )]$

For verbs like *be* and *go* that allow both, the PLACE is underspecified. The CS for *be* in (30), repeated in (83), can stand.

(83) *be*: [$_{\text{STATE}}$ BE ([$_{\text{THING}}$] , [$_{\text{PLACE}}$])]

Other semantic annotations on CS arguments besides category can have the effect of selecting arguments. To take an example from Hale and Keyser (1986), *break* requires a direct object that is rigid or taut.

(84) *[$_{\text{NP}}$ The chef] broke [$_{\text{NP}}$ the oatmeal].

This restriction is expressed as an annotation on the first argument of BECOME:

(85) *break*: [$_{\text{EVENT}}$ CAUSE ([$_{\text{THING}}$],[$_{\text{EVENT}}$ BECOME ([$_{\text{THING}}$ <RIGID>],[$_{\text{PLACE-a}}$ AT [$_{\text{PLACE-a}}$ <BROKEN >]])]])]

This CS annotation will prevent the CS of an NP like *the oatmeal* from fusing with this position.[21]

In sum, it is CS specifications – PLACE vs. THING, abstract vs. concrete, RIGID – that are the selection mechanism limiting a verb's arguments. A selected XP must be semantically compatible with the relevant portion of the verb's CS, and a selection violation is simply a conflict with some CS feature. Since our knowledge of such features is still extremely crude, we will usually not attempt to represent them. And where we do, rather than proposing any new universal semantic primitives, we will simply use upper case English words.

We began this chapter by replacing theta grids with CS representations in which theta roles are not primitives. However, we want to be able to refer to arguments of CS functions, so we will sometimes use terms such as agent, theme, goal, source, and location to do so. But bear in mind that they are just short-hand labels for arguments of CS functions. As illustrated in (86), (87), and (88), "agent" is the first argument of CAUSE; "theme" is the first argument of BE or BECOME; "goal" is a THING argument inside [$_{\text{PLACE}}$ AT ([ ])] in a BECOME clause. "Source" is a THING inside NOT [$_{\text{PLACE}}$ AT ([ ])] in a BECOME clause; "location" is a THING inside [$_{\text{PLACE}}$ AT/IN/ON ([ ])] in a BE clause.

(86)

a. [$_{\text{NP}}$ Sue] put [$_{\text{NP}}$ the books] [$_{\text{PP}}$ into crates].

b. [$_{\text{EVENT}}$ CAUSE ([$_{\text{THING}}$ SUE],[$_{\text{EVENT}}$ BECOME ([$_{\text{THING}}$ THE BOOKS],[$_{\text{PLACE-c}}$ AT ([$_{\text{PLACE-c}}$ IN ([$_{\text{THING}}$ CRATES])])])])]
agent theme goal

---

[21] Other features impose even stricter limits on arguments, as in cases like *butter: She buttered her crumpet with margarine/*olive oil*. Though we believe that many features are represented in CS, it is possible that some are not, rather they are encoded in the "three-dimensional model that supplements CS", in the sense of Jackendoff (1987) Chapter 10.

(87)
a. [$_{\text{NP}}$ Noa] detached [$_{\text{NP}}$ the sail] [$_{\text{PP}}$ from the mast].

b. [$_{\text{EVENT}}$ CAUSE ([$_{\text{THING}}$ NOA], [$_{\text{EVENT}}$ BECOME ([$_{\text{THING}}$ THE SAIL], NOT [$_{\text{PLACE-c}}$ AT ([$_{\text{THING}}$ THE MAST])])])]
| | |
agent theme source

(88) a. [$_{\text{NP}}$ The books] are [$_{\text{PP}}$ in crates].

b. [$_{\text{STATE}}$ BE ([$_{\text{THING}}$ THE BOOKS] , [$_{\text{PLACE}}$ IN ([$_{\text{THING}}$ CRATES])])]
| |
theme location

We will also use this shorthand for talking about arguments of nouns, prepositions and adjectives, whose theta roles are also defined relative to CS. For example, the preposition *into* has a goal; the noun *detaching* and the adjective *detachable*, like *detach*, have a theme and a source (but unlike *detach*, have no agent).[22]

In addition to using these simpler references for positions in CS, in order to make our examples easier to read, we will simplify our notation, as shown in (89). Instead of empty brackets labelled THING, as in (89a) we will often use small letter variables, x, y, z as in (89b). We can then refer to “x” instead of “agent” or “first argument of CAUSE”. We will usually drop the -c and -a suffixes on PLACEs and omit EVENT and STATE labels on CS clause brackets except where we are focusing on the distinction between EVENTs and STATEs. And we will often omit the parentheses introducing the single argument of PLACE functions.

(89) a. *put*: [$_{\text{EVENT}}$CAUSE ([$_{\text{THING}}$], [$_{\text{EVENT}}$BECOME ([$_{\text{THING}}$], [$_{\text{PLACE}}$ AT ([$_{\text{PLACE}}$ IN ([$_{\text{THING}}$])])])])]

b. *put* (simplified): [CAUSE (x , [BECOME (y , [$_{\text{PLACE}}$ AT ([$_{\text{PLACE}}$ IN z])])])]

In addition, where the content of the PLACE is not germane, we will sometimes omit the AT function and its argument, as shown in (90) (but retain any selectional restrictions).

(90) a. *break*: [CAUSE ([$_{\text{THING}}$], [BECOME ([$_{\text{THING}}$ <RIGID>], [$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ <BROKEN>]])])]

b. *break* (simplified): [CAUSE (x , [BECOME ([$_{\text{THING}}$ <RIGID>], [$_{\text{PLACE}}$ <BROKEN>])])]

Finally, where space is an issue, we will omit the outermost square brackets on the highest function.

---

[22] The noun, *detachment*, though originally derived from *detach*, has undergone semantic drift and does not appear to have a related argument structure:

(i) These sails are easily *detachable* from the mast.

(ii) The *detaching*/**detachment* of sails from masts can take a long time.

1.5 Argument Structure: The Interface Projection from CS

One motivation for using Conceptual Structures rather than theta grids is that they provide a way to represent “implicit” thematic roles–those roles that are not syntactically realized. They are represented in CS, but are not designated as linking to the syntax. So while *put*’s three CS constituents are all syntactically realized, for *bottle*, with a similar CS, only two are, the agent and the theme.

(91) DS: [$_{\text{NP}}$ Sue] put [$_{\text{NP}}$ her books] [$_{\text{PP}}$ into crates].

AS: a [a a]

CS: [CAUSE (x , [BECOME (y , [$_{\text{PLACE}}$ AT ([$_{\text{PLACE}}$])])])]

(92) DS: [$_{\text{NP}}$ Emilio] bottles [$_{\text{NP}}$ his own olive oil].

AS: a [a]

CS: [CAUSE (x , [BECOME (y , [$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ IN [$_{\text{THING}}$ <BOTTLES>]]])])]

As mentioned above, we use circles (instead of subscripts) to indicate the linking constituents and at the same time we have introduced another line between CS and DS, where the CS arguments that link as syntactic arguments are registered, AS. As shown schematically in (93), AS is not intended to be an additional level, but is rather a simplified “interface”, displaying the linking arguments of each lexical item, and indicating whether they link externally or internally, as determined by our linking theory. AS thus serves as the representation on which the Theta Criterion operates.

(93) **CS - syntax mapping**

syntax	D-Structure	[. . . XP . . . YP . . . ZP . . .]
	Theta Criterion	
	Argument Structure	a [a a]
	Linking Rules	
lexicon	Conceptual Structure	[CAUSE (x , [BECOME (y , [$_{\text{PLACE}}$ AT ...])])]

Notice that AS does not articulate the complete DS clausal nucleus, only the number of arguments and whether they are internal or external. It is thus a theory-neutral representation of syntactic positions, an abstract short-hand for expressing the associations of CS and DS elements, whatever the right theory of the clausal nucleus turns out to be.

An interesting property of argument structure observed by Hale & Keyser (2002), and theoretically accounted for in their framework by Juarros (2003), is that crosslinguistically, the number of AS arguments per head is limited to three – one external and two internal. We take this 3-argument limit as defining an AS “template” that, in its maximal form, will have the shape in (94).

(94) a [a a]

With lexical entries expressed in CSs with syntactically relevant CS constituents annotated as linking, displayed in AS and mapped to DS positions, we are eliminating traditional subcategorization frames to mediate between the CS and the syntax, which, we will show, are more stipulative than our system. As shown for *put* in (95), subcategorization stipulates the syntactic category and the bar-level of the verb’s arguments.[23]

(95) DS: $[_{NP}$ Sue] put $[_{NP}$ the books] $[_{PP}$ into crates].

subcategorization: [____ NP_j PP_k]

put

CS: [CAUSE ($[_{THING}]_i$, [BECOME ($[_{THING}]_j$, $[_{PLACE}$ AT ($[_{PLACE}\ ]_{\{k\}}$) $]_{\{k\}}$)]]

In addition, subcategorization stipulates the order of the internal NP and PP relative to the verb and to each other. These arguments are subscripted with the CS constituents that link to them: the theme (j) links to the object NP, and either of two nested PLACE constituents, both labeled (k), link to the co-indexed PP (here it is the outer one).[24] The agent (i) links to the subject position (not mentioned in subcategorization), by convention. Another drawback of subcategorization frames is that they express information that is redundant, already predictable from independent principles of grammar (Pesetsky, 1982, Travis, 1984).

In contrast, we do not need to mention the order of the NP and PP, which follows from case principles. Also predictable are the categories of the XP arguments, since they must be semantically compatible with the CS constituents that they express: NPs express things; PPs, places. Moreover, AS does not introduce any information not already encoded in CS or DS or in our CS-based linking rules, though at this point it may appear that there are potentially two: which argument is mapped to the external argument position, outside the brackets, and (though we have stopped marking it with underlining for most of this chapter) which internal argument is direct.

We will show that the internal/external distinction is predictable from our linking theory, which we will introduce in Chapter 3. But first we will do away with the direct-indirect distinction between internal arguments. We turn to that now.

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[23] This entry comes from Jackendoff (1990), whose CS level uses GO and PATH. We are using BECOME and PLACE for ease of comparison.

[24] For Jackendoff, the outer k selects PPs like those in (i); the inner k, those in (ii):

(i) put the books [at the door] / [with the telephone]

(ii) put the books [into crates] / [onto the shelf]

In our system, as we mentioned above, *put* links the outer PLACE. Prepositions that occur with both *put* and *be* (which links a simple PLACE) have two representations, as in (72) and (77) above.

Chapter 2
Eliminating the Direct/Indirect Internal Argument Distinction

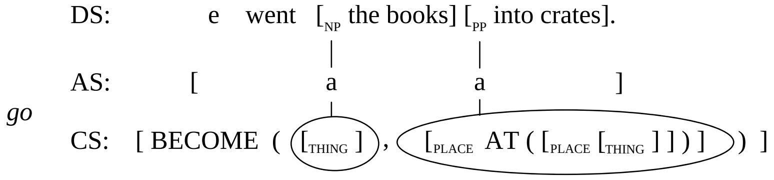
2.1 Reasons to Eliminate Indirect Arguments

In the spirit of traditional subcategorization frames, we have been assuming that categories other than NPs can be arguments. For verbs like *be*, *go* and *put* in (1), it is the entire PP *in crates* or *into crates* and not the inner NP *crates* that is the verb's argument.

(1) a. The books are [$_{\text{PP}}$ in crates].
b. The books went [$_{\text{PP}}$ into crates].
c. Sue put her books [$_{\text{PP}}$ into crates].

This is because, as shown in (2), it is the entire outer PLACE constituent in CS, rather than the THING constituent inside it, that is linked to the syntax. And it is this [$_{\text{PLACE}}$ AT ([$_{\text{PLACE}}$ [$_{\text{THING}}$]])] that imposes selectional restrictions on the PP, determining the choice of *into* as opposed to *in*.

(2)


DS: e went [NP the books] [PP into crates].
AS: [a a]
go
CS: [BECOME ([THING] , [PLACE AT ([PLACE [THING]])])]

A side effect of taking this tack is that we give up the direct/indirect argument distinction,[1] in which an indirect argument like *crates* receives a theta role only indirectly from the verb because it is inside a PP. Rather, its theta role is assigned

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[1] The distinction was originally argued for by Levin & Rappaport (1986) on the basis of adjectival passives and by Grimshaw & Mester (1988) for light verbs in Japanese. See also Marantz (1985), Zubizaretta (1987), and Rappaport & Levin (1988). The distinction continues in event structure frameworks, including van Hout (1998), Borer (1994, 1998) and Ritter & Rosen (1998), among others.

J. Randall, *Linking: The Geometry of Argument Structure*, 35–52

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“directly” by the preposition, and varies depending on what the preposition is (e.g., *to* assigns goal; *from* assigns source, and so on). In our view, the PP *into crates* is as direct an argument as the NP *the crates* is in (3).

(3) [$_{\text{NP}}$ The heavy books] broke [$_{\text{NP}}$ the crates].

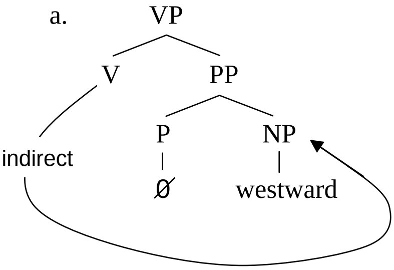
But giving up indirect arguments as a side-effect of treating PPs as arguments raises the question of whether giving up indirect arguments is independently motivated. Perhaps there are reasons to keep them. The answer, we will argue, is no. The direct/indirect argument distinction is something we should give up, for a number of reasons.

First, cases like (4) pose two problems to the notion “indirect” argument.

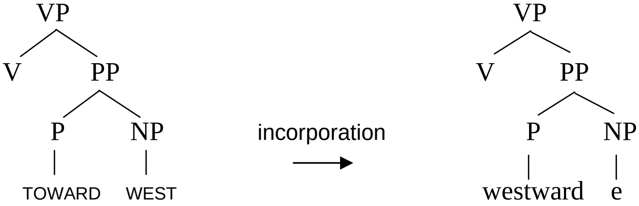
(4) a. Sue is here/there.
b. Sue went home/westward/downtown/downstairs.
c. Sue put her books somewhere/everywhere/outside.

The first problem is that the arguments in question (*here, home, westward, somewhere*, etc.) are not NP arguments of a preposition, but single-word arguments of the verb itself. The only way to maintain the claim that these XPs are indirect arguments of the verb would be to postulate a PP headed by an abstract preposition. We could do this either as in (5a), with a phonologically null preposition and indirect theta-marking of the NP, or as in (5b), by incorporating an abstract preposition into an abstract object NP.

(5) a.



b.



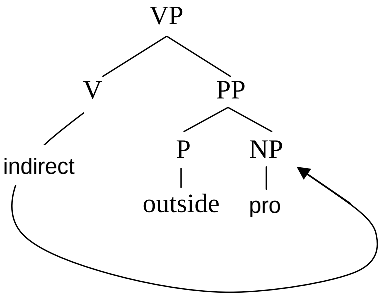
But both of these abstract solutions entangle the syntax in morphological irregularity. (Why can we say *westward* but not **hereward*?) And the only motivation for such an analysis is to preserve the claim that these verbs take an indirect argument. If we abandon that claim, we can simply say that the internal argument, whatever its category, is selected by the PLACE requirement in the verb's CS. The single-word XPs, *here*, *home*, *westward*, and *somewhere* mean "PLACE", that is, they are specified as PLACEs in their lexical entries. The CS of the multi-word PP *into crates*, though built up compositionally, also designates a PLACE. As long as the XP (be it a PP or another category) is compatible with the PLACE specification on the verb, the output will be grammatical. No abstract preposition is required.

A similar problem arises with intransitive prepositions like those in (6).[2]

(6) a. Sue went inside/outside/aside/out/away.
b. Max walked around/along.

Here the internal argument of *go* (*walk*, etc.) appears to be satisfied by the preposition alone; the preposition has no NP object that **could** serve as the indirect argument of the verb. We could again postulate an abstract PP, this time with a phonologically null object as the indirect argument of the verb:

(7)



But this is all unnecessary once we claim that the PP itself is the argument of the verb, satisfying the PLACE requirement in the verb's CS.

The second problem for the direct/indirect internal argument distinction is a structural one. If the argument of the verb is not the PP but the NP prepositional object inside it, then the verb s-selects this NP prepositional object and specifies its theta role. However, the verb cannot technically theta mark this NP because it is not in a structural position to do so. The NP must be theta marked by its sister, the preposition. But this means that an argument in the CS of a verb can project into a non-local position, a non-sister, in the syntax. This is a significant weakening of the structural conditions under which selection and theta role assignment can take place.

A third, related, problem is that doing things this way entails making what seems to us to be a slippery distinction between specifying the theta role of an argument and assigning a theta role to it. By specifying the theta role of its indirect argument NP, the verb is essentially selecting the preposition, since the preposition has to be of the type that assigns the NP the appropriate theta role.

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[2] See Emonds (1972) for arguments that all of these are in fact intransitive prepositions.

By eliminating indirect arguments, we can maintain the claim that all selection and theta marking is local, obtaining between a verb and its sister(s). *Go* thus selects and theta marks an entire PP (or other XP) designating a PLACE. But since the CS of this PP is first built up by fusing the object into the CS of the preposition, it *appears* that the verb is selecting the non-local preposition inside it. By abandoning the notion "indirect" internal argument, we return to the traditional, more constrained, view that argumenthood requires sisterhood at DS.[3]

2.2 Apparent Problems and Their Solutions

Having eliminated the direct/indirect distinction amongst internal arguments, we must now deal with three apparent problems.

2.2.1 Syntactic Category

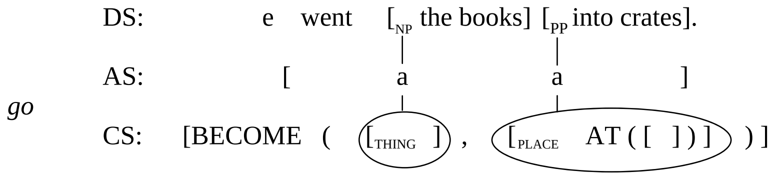
The first problem is how to ensure that the arguments of unaccusative verbs like *go* and *live* are realized as phrases of the correct syntactic category. That is, in (8a), the goal (*crates*) and the location (*this forest*) are realized in a PP, not an NP. After all, (8b) is ungrammatical.

(8) a. The books went *into crates*.
Wild animals live *in this forest*.

b. *The books went *crates*.
*Wild animals live *this forest*.

Our answer is that (8b) will not be generated. As shown in (9), the CS of [$_{PP}$ *into crates*] links to the entire PLACE function in the verb's CS, not to a THING inside it. Whatever XP is chosen must be compatible with this PLACE specification. Since the NP [*crates*] designates a THING and not a PLACE, it violates this selectional restriction and will not be selected.

(9)


DS: e went [NP the books] [PP into crates].
AS: [a a]
go
CS: [BECOME ([THING] , [PLACE AT ([ ])])]

The same is true for *this forest*. (The relevant difference between *go* and *live* is that *go* denotes change-of-location while *live* denotes location.)

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[3] Claiming that indirect object PPs are arguments runs counter to Emonds (1993), who does not consider them "true" PPs because (a) they alternate with bare NPs and bare dative clitics, in Romance languages, for example, and (b) the choice of preposition is limited (*to/for*), suggesting that it is inserted purely for case reasons.

Notice that NPs can appear with these verbs, provided that they denote PLACEs:[4]

(10) a. The books went *that route*.
b. Wild animals live *this way*.

The flip-side of this problem evaporates equally quickly. Verbs like *enter* and *inhabit* contrast with *go* and *live* in that their goal (or location) is realized as an NP sister of the verb, not a PP.[5]

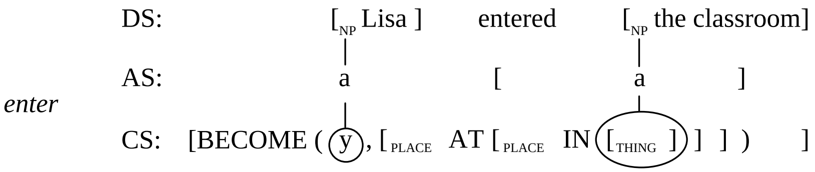
(11) a. *Lisa entered *into the classroom*.
*Wild animals inhabit *in this forest*.

b. Lisa entered *the classroom*.
Wild animals inhabit *this forest*.

If we can no longer treat the goal as a direct internal argument for *enter* (and *inhabit*) and an indirect internal argument for *go* (and *live*) then how do we insure that the *enter* class is assigned a postverbal NP?

The answer is that for these two verb classes different CS constituents link. Whereas for *go*, in (9), it is the entire PLACE that links, for *enter* in (12), it is the THING inside it. (For clarity, we represent this constituent as [$_{\text{THING}}$] rather than a variable such as z, our shorthand notation for THINGs.)

(12)



The grammaticality difference between (8) and (11) follows from the fact that *the classroom* and *the forest* are THINGs, while *into the classroom* and *in this forest* are PLACEs. The sentence *x entered y* means 'x came to be *in* y' exactly because the PLACE function [AT [IN . . .]] is incorporated into the verb *enter's* CS (Jackendoff 1989) and what links is the THING it contains.[6]

It might be objected that the contrasts between *go* vs *enter* and *live* vs *inhabit* are purely a matter of lexical stipulation. It has to be specified on a verb-by-verb basis whether what links for a given verb is a PLACE or a THING inside a PLACE. But representing this contrast in terms of direct vs. indirect internal argument require just the same sort of lexical stipulation, verb by verb.

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[4] Jackendoff (1990:77) notes that these NPs satisfy the PLACE requirement for verbs like *climb: We can get down there by climbing [this route/this way].*

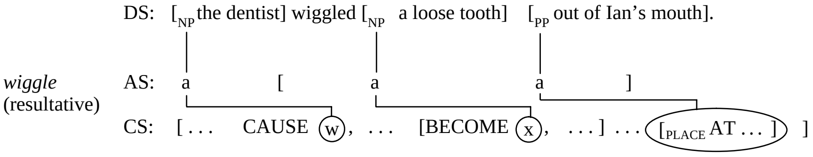
[5] Other pairs include *penetrate* NP vs *go* [$_{\text{PP}}$ *through* NP], *leave* NP vs *depart* [$_{\text{PP}}$ *from* NP], *exit* NP vs *go* [$_{\text{PP}}$ *from* NP].

[6] After presenting our linking theory, in Chapter 7 we will modify our analysis of these verbs. But the essential linking difference will remain.

2.2.2 Linear Order

Dropping the direct/indirect argument distinction poses a second challenge: accounting for linear order in the syntax. Now, for three-argument verbs like resultative *wiggle* in (13), the two internal arguments are both direct arguments relative to the verb. How do we ensure that the theme, linked to the NP, is realized adjacent to the verb as in (13), and not as in (14)?[7]

(13)


DS: [NP the dentist] wiggled [NP a loose tooth] [PP out of Ian's mouth].
wiggle (resultative)
AS: a [a a]
CS: [. . . CAUSE w, . . . [BECOME x, . . .] . . . [PLACE AT . . .]]

(14) *The dentist wiggled [$_{PP}$ out of Ian's mouth] [$_{NP}$ a loose tooth].

Recall that linear position in our AS representations has no significance. It is just for notational convenience that the AS position linked to PLACE is on the right, so it will not ensure that the PP that satisfies the PLACE argument (*out of Ian's mouth*) will occur to the right of the NP in the syntax. The solution lies in the interaction of s-selection with general syntactic principles (Stowell, 1982). Recall that we are using the variables w, x, y, and z to stand for [$_{THING}$]. So in (13), the syntactic XP that is identified with the AS position linked to x in the CS (the theme) must satisfy the CS condition that it be a THING. THINGs are always nouns (or some kind of nominal), as far as we know. Nouns head NPs, which require case, and must therefore be adjacent to the verb. In contrast, PLACEs are typically PPs, APs or AdvPs which do not need case, so they need not be adjacent to the verb. So the direct-indirect distinction is not needed for guaranteeing the right order, given s-selection and the case-filter.[8]

2.2.3 Lexical Rules

The final and perhaps most threatening challenge to abolishing the direct/indirect distinction is the existence of lexical rules that have been claimed to be sensitive to that distinction. The crucial question is whether these lexical rules can be restated so as not to refer to direct or indirect internal arguments. We will show that they can.

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[7] Our CS for *wiggle* is incomplete; we will justify a complete CS for transitive resultatives like *wiggle* in Chapter 5.

[8] As usual, double object constructions are a problem. (i) and (ii) should both be ungrammatical, since the second NP has no way to get case under adjacency. We will not pursue a solution to this problem here.

(i) The dentist gave Ian a toothbrush.
(ii) *The dentist gave a toothbrush Ian.

2.2.3.1 Adjectival Passive Formation

Levin & Rappaport (1986) propose a Direct Internal Argument Condition on the rule of Adjectival Passive Formation (APF).[9]

(15) **Adjectival Passive Formation** (Levin & Rappaport 1986)
Externalize a direct internal argument.

They point out that although the verb *read* can occur in the three argument frames in (16), only two of them have corresponding adjectival passives, as shown in (17) and (18). (Affixing the participle with *un-* or using it prenominally guarantees the adjectival and not the verbal passive reading):[10]

(16) a. They read books to the children.
b. They read books.
c. They read to the children.

(17) a. The books remained unread to any children.
b. The books remained unread.
c. *The children remained unread.

(18) a. the read books; the unread books
b. *the read children; *the unread children

(17c) cannot be ruled out on thematic grounds; [$_{\text{NP}}$ *the children*] is a goal, but being a goal is not a problem, as the grammatical (19) shows:

(19) The children remained unfed.

The problem, they claim, must be that [$_{\text{NP}}$ *the children*] is not a direct internal argument. However, if, as we are claiming, the internal argument of *read* is [$_{\text{PP}}$ *to the children*] not [$_{\text{NP}}$ *the children*], we can weaken (15), changing the "direct" internal argument requirement to simply an internal argument requirement, and (17c) and (18) would not be generated.

The adjectival passive is derived as follows. First, as shown in (20), Verbal Passive Formation (VPF) applies to the AS of an active verb such as *break* (*Joe broke a cup*). VPF suppresses the verb's external argument to derive the passive verb

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[9] Though the formulations of APF are diverse, the history of this condition goes back to Wasow (1977), Williams (1981), Bresnan (1982d) and Grimshaw (1990), among others. Note that this rule describes only the AS effects of APF, not the morpho-phonological ones.

[10] *Read* has another AS in which both internal arguments are obligatory:

(i) read the children books
(ii) *read the children

$[_A$ *broken*] (*a cup was broken by Joe*). APF, in (21), operates on the output of VPF, externalizing the internal argument and converting the verb $[_A$ *broken*] into an adjective (*a broken cup*).

(20) **Verbal Passive Formation**
Suppress the verb's external argument.

AS of active verb:	a [a]	*Joe* $[_V$ *broke*] *a cup*
↓ VPF		
AS of passive verb:	[a]	*a cup was* $[_V$ *broken* $]_{[-acc]}$ *(by Joe)*

(21) **Adjectival Passive Formation**
Externalize an internal argument of a passive verb.

AS of passive verb:	[a]	*a cup was* $[_V$ *broken*] *(by Joe)*
↓ APF		
AS of passive adjective:	a [ ]	*a* $[_A$ *broken*] *cup*

For *read*, which can appear with either of its two optional internal arguments as in (16b,c), nothing in the statement of APF prevents it from externalizing either one:[11,12]

(22)
read (active) DS: read [books] [to the children]
AS: a [(a) (a)]

And while *the children* cannot be externalized because it is not an argument, what prevents the entire PP from being externalized to produce (23a)? The rule externalizes other PP internal arguments, as in (23b):

(23) a. *[To the children] remained unread.
b. [Under the bed] remained unexplored.

---

[11] Levin & Rappaport note that it is impossible to incorporate the PP inside the adjective as in (i), citing Williams' (1982) Head Final Filter. But the cases in (ii) are also ungrammatical.

(i) *the $[_A$ read to the children] books
(ii) *the $[_A$ read] books to the children
*the $[_A$ read] books of children
*the $[_A$ read] children of books

This is because these arguments cannot be realized outside the domain of the adjective, from which position they cannot satisfy an argument in the adjective's AS.

[12] We are using parentheses in AS only as a shorthand, as will become clear when we discuss the issue of parenthesizing optional arguments in Chapter 4, Section 1.

The problem is semantic: the subject of an adjectival passive must be an entity. (23b) qualifies; it means "the area under the bed". (23a) does not. So (23b) is not a threat to eliminating the direct/indirect argument distinction.

There is one more challenge to eliminating the Direct Internal Argument Condition on APF. Carrier & Randall (1992) used it to explain why transitive resultatives can form adjectival passives but intransitive resultatives cannot:[13]

(24) a. Adjectival passives from transitive resultatives
the watered-flat tulips
the spun-dry sheets
the smashed-open safe
the rubbed-smooth stones

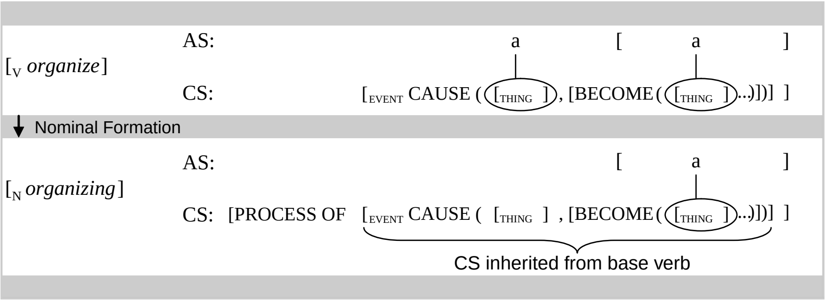
b. Adjectival passives from intransitive resultatives
*the run-threadbare Nikes
*the danced-thin soles
*the crowed-awake children
*the talked-unconscious audience

But we will show in Chapter 5, when we discuss resultatives in more detail, that the postverbal NP in an intransitive resultative is not an argument of the verb at all. So (20) will account for the difference between (24a) and (24b) after all.

2.2.3.2 Nominal Formation

In the previous chapter, we looked briefly at how Nominal Formation (NF) works.[14]

(25)


[V organize]
AS: a [a]
CS: [EVENT CAUSE ([THING]), [BECOME([THING]...)])]]
Nominal Formation
[N organizing]
AS: [a]
CS: [PROCESS OF [EVENT CAUSE ([THING] , [BECOME([THING]...)])]]
CS inherited from base verb

NF is generally characterized as making two changes to Argument Structure. Like Verbal Passive Formation in (21) it suppresses the verb's external argument and inherits its *direct* internal argument as shown in (26).[15]

---

[13] Again, to ensure that these passives are adjectival and not verbal, we are using them in adjectival contexts here, inside compounds. We will continue this practice throughout.

[14] We are concerned here with process *-ing* nominals that have an event structure, not result *-ing* nominals (See Randall, 1988; Grimshaw, 1990).

[15] An optional *by*-phrase adjunct can realize the thematic role of the suppressed external argument, as shown in (i).

(26) **Nominal Formation (preliminary)**
Suppress the verb's external argument if there is one. Convert V to N.

AS of active verb:	a	[	$\underline{a}$	]	*students* [$_V$ *devour*] *junkfood*
↓ NF					
AS of nominal:		[	$\underline{a}$	]	*the* [$_N$ *devouring*] *of junkfood*

In fact, though, Carrier & Randall (1992) showed that the “*of*-NPs” in the nominals formed by NF are of three distinct types, with three different relationships to the base verb, as stated in (27a), one of them requiring a direct internal argument. Examples are shown in (28):

(27) An *of*-NP may be
a. a *direct internal* argument
b. an adjunct corresponding to the suppressed external argument
c. an adverbial adjunct

(28) a. a direct internal argument
The devouring *of vast quantities of junk food* takes no time at all.
For New Year’s Eve parties, just the slicing *of the cheese* often takes two hours.
After heavy snowfalls, the clearing *of major roads* can take hours.

b. an adjunct corresponding to the suppressed external argument
the rejoicing (*of the villagers*) lasted for days
the giggling (*of the excited campers*) lasted long into the night
the babbling (*of the babies*) lasted three hours

c. an adverbial adjunct[16]
The constant rejoicing *of the holiday season* makes Fred nervous.
The quick cooking *of the 1990’s* requires a microwave.

(i) a. Junkfood is devoured every day *by those students.*
b. The devouring of junkfood *by hungry students* can take no time at all.

But this adjunct does not correspond to a position in the AS of the nominal. We will look at the details of *by*-phrase adjuncts in our discussion of passive verbs in Chapter 4, Section 4.1. Note that not all *by*-phrases are construed with suppressed arguments. Neither result nominals, (iia), nor non-derived nouns, (iib), has an AS, yet both can appear with *by*-phrases (Wasow, 1977; Grimshaw, 1990).

(ii) a. The assignment by Fred was no good.
b. a symphony by Mozart
a portrait by Vermeer
body by Fisher

[16] Exactly what kinds of adverbials fall into this category is a question we will not pursue here. However, in addition to the time adverbials in (28) are cases like (i):

(i) the constant rejoicing *of certain religious areas in India*
the frequent rejoicing *of the southern countries*
the constant rejoicing *of certain religious life-styles*

We need to show that the constraint in (27a) requires simply an internal not a direct internal argument, that it can be weakened to (29a):

(29) An *of* - NP may be a. an *internal* argument
b. an adjunct corresponding to the suppressed external argument
c. an adverbial adjunct

We will show that the evidence that Carrier & Randall (1992) gave for a *direct* internal requirement on NF requires only an internal argument.

The rule of Nominal Function is not (26), but (30):

(30) **Nominal Formation**
Suppress the verb's external argument if there is one. Convert V to N.

AS of active verb:	a [a]	*students* [$_V$ *devour*] *junkfood*
↓ NF		
AS of nominal:	[a]	*the* [$_N$ *devouring*] *of junkfood*

First, NF does not apply to VP idioms like (31). It also fails for cases like (32) in which only the object is idiomatic.

(31) a. we pulled John’s leg b. *the pulling of John’s leg
he kicked the bucket *the kicking of the bucket
she doesn’t give a damn *the giving of a damn

(32) a. it rained cats and dogs b. *the raining of cats and dogs
they ate tons *the eating of tons

But not only are these *of*-NPs not direct internal arguments, they are not arguments of their underlying verbs at all. So (29a) is sufficient.

Second, NF can apply to transitive resultatives, (33a), but not intransitive unergative resultatives, (33b):

(33) a. the watering of tulips flat
the cooking of food black

b. *the running of Nikes threadbare
*the shouting of throats hoarse.

But, similarly, as we will review in Chapter 5, the postverbal NPs in (33b) are not arguments of these verbs either. Again (29a) suffices.

Third, NF cannot apply to verbs like *read*, in (34):

(34) a. They read to the children.
b. *their reading of the children

Again, the problem is not that *the children* was not a direct argument of *read*. It is not an argument of *read* at all. As argued for in Section 1, above, the argument of *read* is the PP *to the children*, so (29a) will rule out (34b) as well.

If Nominal Formation is not limited to direct internal arguments but only to internal arguments, it should apply to internal arguments other than NPs. And it does.

As shown in (35), it applies both to sentential complements and to PP arguments. (Note that *of* is not inserted, because these categories do not require case.)[17]

(35) a. The proving (*of) that the earth is not flat took many years.
This noting (*of) that the plaintiff contradicted himself pleased the judge.

b. This reading (*of) to children has become a nightly ritual in many families.
The leaning (*of) against walls that teenagers do annoys their parents.
The gazing (*of) into each other's eyes that new lovers do bothers onlookers.
This looking (*of) for loopholes is time-consuming.
This hiding (*of) in closets has got to stop.

There is one other set of data to discuss before we can eliminate the "direct" requirement on the internal argument condition on NF. Curiously, as (36) shows, unaccusative verbs, such as *become, be,* and *turn* cannot form nominals.

(36) a. Amelia Earhart$_i$ became t$_i$ [$_{NP}$ a famous pilot] / [$_{AP}$ famous].
Amelia Earhart$_i$ was t$_i$ [$_{NP}$ a famous pilot] / [$_{AP}$ famous].
Amelia Earhart$_i$turned t$_i$ [$_{NP}$ a sick shade of green] / [$_{AP}$ green].

b. *the becoming of [$_{NP}$ a famous pilot] / [$_{AP}$ famous]
*the being of [$_{NP}$ a famous pilot] / [$_{AP}$ famous]
*the turning of a [$_{NP}$ a sick shade of green] / [$_{AP}$ green]

However, this does not argue for the direct/indirect distinction, since *a famous pilot* would be direct. Why, then, are these nominals ungrammatical?

The issue is predication. The NP [$_{NP}$ a famous pilot] or the AP [$_{AP}$ famous] is not only an argument of the verb, it is a predicate and requires a local subject. In (36a), the postverbal trace is the subject. But the nominals in (36b) have no trace or other NP to serve as the subject. The same is true for unaccusatives like (37) with PP complements that are also predicates. These are as bad as (36) for the same reason: they lack subjects.[18,19]

---

[17] Determiners like *the* and *this* in (35) preclude giving these *-ing* forms an incorrect verbal reading which arises with possessives: *his proving, their noting*. See Napoli (1993:231–236) who cites Wasow & Roeper (1972) and Reuland (1983).

[18] Notice that a predicate that **has** a local PRO subject causes no problem:

(i) PRO running naked is ill-advised.
(ii) Becoming PRO famous is ill-advised.

Discussing these cases, Carrier & Randall (1992) defined "local" as "mutual m-commanding".

[19] We have not yet explained the ungrammaticality of (i), where the predicate *famous* does have a subject.

(i) *the becoming of Amelia Earhart famous

(37) PP: *the coming [to the party]
*the appearing [at the scene of the crime]
*the falling [on the ground]

In sum, NF does not stand in the way of eliminating the direct/indirect argument distinction. But there is one more lexical rule to consider.

2.2.3.3 Middle Formation

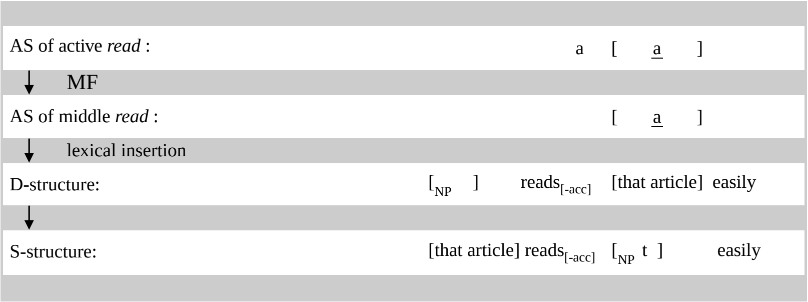
The last hurdle to overcome is the Direct Internal Argument Condition on Middle Formation, or MF (Hale & Keyser, 1987:11).[20]

(38) **Direct Internal Argument Condition on Middle Formation**
MF can apply to a verb only if it has a direct internal argument.

This condition constrains how middles like (39) are derived, as shown in (40) (the essentials of this analysis go back to Fiengo, 1974; Keyser & Roeper, 1984; Hale & Keyser, 1986; among others).

(39) That article reads easily.

(40) **Middle Formation**
Suppress the verb's external argument. Externalize the direct internal argument.



AS of active *read* :		a	[$\underline{a}$]	
↓ MF				
AS of middle *read* :			[$\underline{a}$]	
↓ lexical insertion				
D-structure:	[$_{NP}$]	reads$_{[-acc]}$	[that article]	easily
↓				
S-structure:	[that article]	reads$_{[-acc]}$	[$_{NP}$ t]	easily

In the lexicon, the rule of MF, like Verbal Passive Formation (VPF), suppresses the verb's external argument and its ability to assign accusative case.[21] In the syntax, the postverbal NP corresponding to the direct internal argument moves in order to receive case.

In Chapter 8, Section 1, we will reanalyze these verbs and show that *Amelia Earhart* is actually not an argument of *become*; it is only the external argument of *famous*. Thus *Amelia Earhart* cannot occur as a sister of the nominal *becoming*, in accordance with (29).

[20] The original condition and rule are stated in terms of Lexical Conceptual Structure. Our condition and rule, stated in terms of AS, are equivalent, since AS is a projection of CS.

[21] cf. (20) , above. In addition to the AS change, MF changes the meaning of the verb. Very crudely, it changes an event verb into a stative verb. *NP reads easily* means something like: it is a property of NP$_i$ that [for someone to read NP$_i$] is easy. The adverb [easily] is an example of what we call, in Chapter 4, a "selected adjunct".

The Direct Internal Argument Condition was proposed to explain the contrast between MF and VPF (Fagan, 1988).[22] *Confide* and *laugh*, in (41), whose internal arguments are indirect, cannot undergo MF but can undergo VPF to form so-called "pseudo-passives", as shown in (42).

(41) a. middle: *Mary confides in easily.
*Politicians laugh at easily.

b. passive: Mary is someone who can be confided in.
The politician was laughed at.

VPF suppresses the verb's external argument. After lexical insertion, the passive verb + PP sequence [$_{\mathrm{V}}$ confided] [$_{\mathrm{PP}}$ in Mary] is reanalyzed in the syntax as [$_{\mathrm{V}}$ confided in] [$_{\mathrm{NP}}$ Mary]. *Mary* then moves in order to get case. [23,24]

(42)

AS of active *confide*:	a		[a]
↓ VPF			
AS of passive *confide*:			[a]
↓ lexical insertion			
D-structure:	[$_{\mathrm{NP}}$]	confide$_{[-\mathrm{acc}]}$	[$_{\mathrm{PP}}$ in [$_{\mathrm{NP}}$ Mary]]
↓ reanalysis			
	[$_{\mathrm{NP}}$]	[confide in]	[$_{\mathrm{NP}}$ Mary]
↓ movement			
S-structure:	[$_{\mathrm{NP}}$ Mary]	was [confided in]	[$_{\mathrm{NP}}$ t]

But it is not the directness of the internal argument that explains this contrast. Notice that the Direct Internal Argument Condition fails to explain why MF cannot apply in (43a-b) and also why it *can* apply in (43c).

(43) a. *Horseflies don't hit easily.
b. *Some constellations see easily.
c. This rockface climbs up easily.

---

[22] Fagan's own account of the contrast between (41a) and (41b) is quite different and, we will show, untenable. We postpone discussing it (and a similar analysis by Hale & Keyser, 1987) until after we have discussed resultative verbs, which our arguments hinge on.

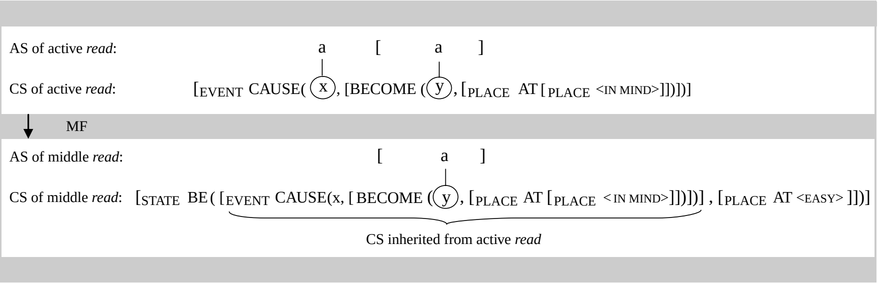
[23] We assume that incorporation absorbs the preposition's case-marking ability in order to explain the forced NP movement in pseudo-passives.

[24] Baker (1988) considers reanalysis a form of incorporation, but we are using the more classical formulation here, where reanalysis is not a lexical process. Interesting evidence for this (noted by Fagan, 1988), is the fact that reanalysis does not feed lexical word-formation processes. Prepositions are deleted rather than incorporated in many derived words:

(i) a. The politician was laughed at.
b. *His defense was laughatable.
c. His defense was laughable.

So there must be another condition on MF. One proposal (Anderson, 1971; Roberts, 1988; and others) is that the object of the input to MF must be **affected**. But this cannot be right; if it were, MF would not be able to apply to *read* to produce (39) (Hale & Keyser, 1987). Rather, MF is subject to a Theme Condition. The inputs in (43a-b) fail because their objects are goals, but the object of active *read* can be construed as a theme in the sense that it enters the subject's mind, as shown in (44). (We drop the underlining in the AS and, for readability, we omit the syntactic portion of the rule.)

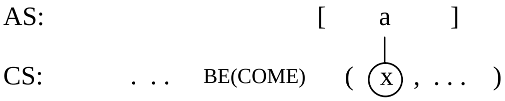
(44)


AS of active *read*:
a [a]
CS of active *read*:
[EVENT CAUSE(x , [BECOME (y , [PLACE AT [PLACE <IN MIND>]])])]
MF
AS of middle *read*:
[a]
CS of middle *read*:
[STATE BE([EVENT CAUSE(x, [BECOME (y , [PLACE AT [PLACE <IN MIND>]])])] , [PLACE AT <EASY>]])]
CS inherited from active *read*

MF embeds the CS of active *read* inside the CS for the middle verb, turning an event verb into a stative verb, with the meaning (roughly), "[for someone to read this article] is easy."[25] And MF can apply whether the theme is direct or not, as (43c) confirms.

So we can now drop the Direct Internal Argument Condition, and revise (38) to (45).

(45) **Internal Theme Condition on Middle Formation**
MF can apply to a verb only if its lexical representation contains:
a. an internal *a* position in AS
which is b. linked to the first argument of a BE(COME) clause in CS:



Returning to the original contrast, (45) allows MF to apply to *read* but not to *confide* or *laugh* in (41a) because *Mary* and *politicians* are goals. This is supported by the prepositions: *in* and *at* typically head XPs designating PLACEs. (45) also predicts a number of other middle contrasts. In (46), MF is impossible (in contrast to Verbal Passive Formation), because *there* fails both conditions: it is not a theme or even an argument of *believe*.

---

[25] We are not committing ourselves to this CS; it is just meant to be suggestive.

(46) a. active: We believe *there* to be three criminals in that drug ring.
b. passive: *There* are believed to be three criminals in that drug ring.
c. middle: **There* believe easily to be three criminals in that drug ring.

And (47b) is significantly worse than (47a), because while both violate the theme requirement, (47b) additionally violates the internal argument requirement.

(47) a. ?*Teary-eyed witnesses believe easily.
b. *Ghosts believe in easily.

Finally, (45) also predicts the contrast between transitive and intransitive resultatives in (48), which we will explore further in Chapter 5.

(48) a. Middles from transitive resultative verbs
NP **water** new seedlings flat → New seedlings water [t] flat (easily).
NP **stretch** that taffy thin → That taffy stretches [t] thin (easily).
NP **cook** sugary food black → Sugary food cooks [t] black (easily).
NP **iron** linen napkins smooth → Linen napkins iron [t] smooth (easily).

b. Middles from intransitive resultative verbs
NP **run** Nikes threadbare → *Nikes run [t] threadbare (easily)
NP **talk** some students into a stupor → *Some students talk [t] into a stupor (easily).
NP **walk** delicate feet to pieces → *Delicate feet walk [t] to pieces (easily).

MF, then, should be stated with **no** Direct Internal Argument Condition on it. The AS portion of the rule should be stated as in (49).

(49) **Middle Formation**
Suppress the verb's external argument. Externalize the direct internal argument.

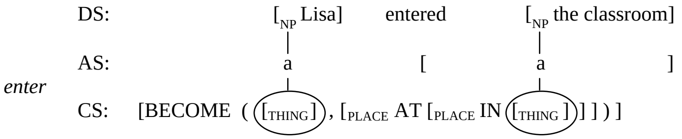
AS of active *read*:	a [a]
↓ MF	
AS of middle *read*:	[a]
↓ lexical insertion	
D-structure:	[$_{\text{NP}}$] reads$_{[-\text{acc}]}$ [that article] easily
↓	
S-structure:	[that article] reads$_{[-\text{acc}]}$ [$_{\text{NP}}$ t] easily

2.3 Summary

At the end of the last chapter, we noted that our AS representations appear to make two distinctions that are not encoded in CS: which internal argument is direct and which argument links to the external argument position. We have now eliminated the first of these. It is not necessary to distinguish direct from indirect arguments. In the next chapter we will show that the second distinction, internal vs. external, is derivable from our CS representations and our geometric approach to linking.

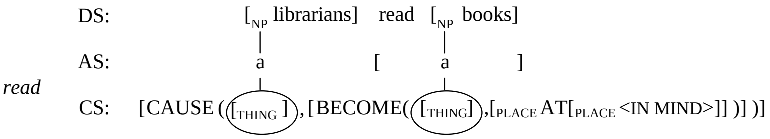
Before proceeding, it is now useful to summarize what our system looks like. Our lexical entries so far contain a CS with certain constituents designated as linking to the syntax, DS. These designated constituents (circled for readability) are each represented as an "a" on a separate AS interface line. There are also elements in CS that do not map to the syntax. These are implicit parts of the meaning of the lexical item. For example, for the verb *enter*, in (50), what links are two $[_{\text{THING}}\ ]$ constituents. The $[_{\text{PLACE}}$ AT $[_{\text{PLACE}}$ IN]] constituent that contains the second $[_{\text{THING}}\ ]$ is implicit, which is why the verb *enter* means something about going *into* a place, not on or under one.

(50)

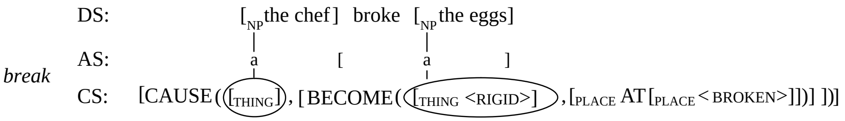


Other verbs have unlinked implicit arguments: *read* and *break* both have an implicit unlinked goal, and *break* also has an implicit selectional restriction, <RIGID>, on its linking theme.

(51)


DS:
[NP librarians]
read
[NP books]
AS:
a
[
a
]
read
CS:
[CAUSE ([THING] , [BECOME([THING] ,[PLACE AT[PLACE <IN MIND>]])])]

(52)

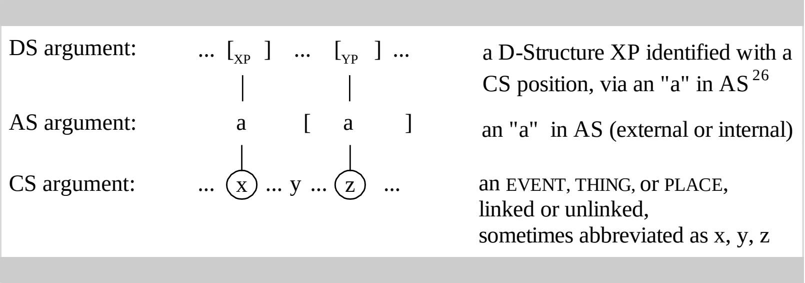

DS:
[NP the chef]
broke
[NP the eggs]
AS:
a
[
a
]
break
CS:
[CAUSE([THING] , [BECOME([THING <RIGID>] ,[PLACE AT [PLACE < BROKEN>]]])]])]

In this model, theta roles are CS arguments of CS functions (agent is the first argument of CAUSE, theme is the first argument of BE(COME), etc.) And those that link appear as a's in AS. As such, the Theta Criterion can operate on the mapping between AS and DS, since the implicit pieces of CS that do not appear in AS are not arguments. Although our CSs are similar to Jackendoff's (1983, 1990), our AS differs from his subcategorization level in making no reference to bar-level category or linear order of the arguments in syntax. And it is also more stripped down than the argument structures of Rappaport & Levin (1988), as we have done away with the direct/indirect internal argument distinction since verbs can take PPs as arguments.

To clarify things in advance, we will make a few remarks on terminology. Because of the different notions of Argument Structure in the literature, the terms "theta role", "thematic role", and "theta marking" have been used in different ways. From now on we will use "theta role" or "thematic role" to refer to a constituent in Conceptual Structure. In our terminology, when we say that a verb "theta marks" the NP following it, we mean that this NP is identified with an “a” in the verb’s AS, which is, in turn, linked to a constituent in the verb’s CS. Thus, the assignment of theta roles to D-structure XPs is projected through AS, the interface that isolates just the CS elements that are visible to the syntax.

Another potential source of confusion is the term “argument”. In the literature, “argument” has been used to refer to an entity in each of our three representations: DS, AS, and CS. Since we will continue to talk about arguments in each representation, we need to define what we mean. Definitions are given in (53). (In (53), y is an implicit CS argument, a CS constituent that does not link to the syntax, with no associated AS or DS argument.)[26]

(53) **Definitions of argument**



DS argument:	... $[_{XP}\ ]$ ... $[_{YP}\ ]$ ...	a D-Structure XP identified with a CS position, via an "a" in AS[26]
AS argument:	a [a]	an "a" in AS (external or internal)
CS argument:	... x ... y ... z ...	an EVENT, THING, or PLACE, linked or unlinked, sometimes abbreviated as x, y, z

When it is not clear from context which sense of “argument” we intend, we will explicitly refer to “CS argument”, “AS argument” or “DS argument” or to “syntactic argument”, a linking CS argument that is visible at AS and associated with an XP at DS.

In using lexical CSs with AS projections, we are encoding semantic information in CS and registering at AS just the linking information – those CS elements that correspond to syntactic arguments. But as we have stressed, this interface line is just separated from CS and DS for readability. It is not an independent level of representation and so it should not add add any information beyond what is already present in CS, DS, and the linking rules that link the lexical constituents to the syntax. Now, we have just eliminated the direct/indirect internal argument distinction, but as we have mentioned, AS still does make one distinction that is not encoded in CS: which argument is mapped to the external argument position. In the next chapter we will show that this distinction is derivable from the geometry of our CS representations and our linking theory, to which we now turn.

---

[26] We are working under the assumption that syntactic arguments are sisters of their heads, to capture (among other facts) the argument/adjunct distinction. Other syntactic theories, which give up this assumption, handle the data in some other way. See Carrier & Randall (1992) and Emonds (2000, Section 2.3) for a discussion of the relationship between argumenthood and sisterhood.

Chapter 3
Explaining Linking Regularities

In the examples we have considered so far, the linking of CS arguments to syntactic positions is stipulated on an entry-by-entry basis, which suggests that these associations are arbitrary and can be different for each verb. In fact, however, the syntactic realization of thematic roles is generally predictable cross-linguistically, as has been well-known since the early work of Fillmore (1968), Carter (1976), and Ostler (1979). For example, for causative verbs (*read, break*), the agent, if it links, links to the external argument, and the theme, if it links, links to an internal AS argument. We do not find verbs like the hypothetical verbs *shmead* or *shmeak* in (1), which are identical in all respects to the English verbs *read* and *break* except that the syntactic realizations of agent and theme are reversed.

(1) a. *Books shmead librarians. (meaning = Librarians read books.)
b. *The eggs shmoke the chef. (meaning = The chef broke the eggs.)

Such generalizations have been called linking regularities, and a principled account of them – a theory of linking – is the focus of this chapter.

Before we begin, it is useful to point out that we have been using (and will continue to use) fully-specified lexical entries with each linking CS constituent mapped with a linking line to our AS interface. Alternatively, lexical entries could be underspecified: CSs could simply designate which constituents link but not where, their syntactic position derived as the output of the linking rules acting on the CS. But it is no more costly to assume fully-specified entries than underspecified entries plus linking rules (which, like lexical redundancy rules, discount all but the unpredictable information (Jackendoff, 1975; Aronoff, 1976)). Thus the two representations are essentially equivalent. As we introduce our linking theory, we will couch our discussion in terms of an underspecification model, in terms of the principles that “fill in” the linking lines connecting CS elements to AS positions. But this is only an expository device; nothing we will say hinges on it.

Our linking theory will have to do better than the two classic hypotheses concerning linking regularities in the literature, and their offshoots. The first one is the Thematic Hierarchy Hypothesis (or THH), exemplified by the work of Ostler (1979), Carter (1976), Carrier-Duncan (1985) and Jackendoff (1990). The second hypothesis is exemplified by Baker’s (1988, 2001) Uniformity of Theta Assignment

J. Randall, *Linking: The Geometry of Argument Structure*, 53–87

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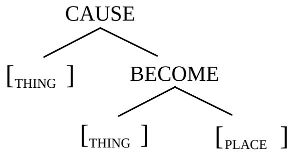
Hypothesis, or UTAH, and the linking rules of Levin & Rappaport Hovav (1995) and Rappaport Hovav & Levin (1998a and later). After we lay out our linking theory, we will compare it to these two approaches to see how it solves a number of problems that they leave unsolved.

3.1 A New Linking Proposal: The Isomorphic Linking Hypothesis

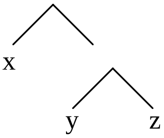
It is possible to explain the prevalence of certain linkings cross-linguistically if we take seriously the claim that theta roles are relational notions (Jackendoff, 1983, 1990) in a hierarchically structured representation. "Agent" stands for "first argument of CAUSE", "theme", for "first argument of BE(COME)". What we will exploit about these relations is their structural difference in CS. We will claim that linking patterns are a consequence of CS geometry. Precedence in linking reflects not some arbitrarily stipulated hierarchy, but the hierarchy encoded in CS.

A typical CS like (2), consisting of terminals dominated by CS function nodes, can be represented schematically, as in (3).

(2)



(3)



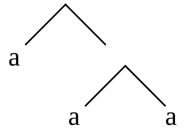
The syntactic positions to which CS elements link also have a geometry. At the most abstract level, an argument position is either external or internal. We can represent this schematically using a maximal three-argument Argument Structure (AS) "template", with one external and two internal arguments, (4), which translates into the tree in (5).[1]

(4) a [a a]

---

[1] As we mentioned in the Introduction, this template abstracts away from the particulars of the clause nucleus, which we want to avoid so as to be theory-neutral. But in all syntactic representations, even if internal DS arguments are not sisters, as in Larsonian shells (Larson, 1988 and after) such as (i), or more articulated structures, such as those proposed in Borer (2005), Bowers (1993), Chomsky (2000, 2001), McGinnis (2004), Ramchand (2008), Ritter & Rosen (1998), and Travis (2000), among others, the external argument, (1), is always higher than and c-commands any

(5)



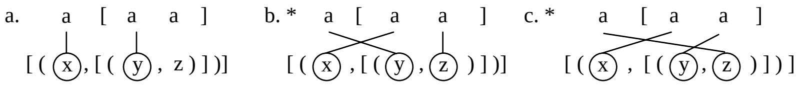
As previewed in the Introduction, the hypothesis that we will pursue is that there is isomorphy between CS and AS. The tree geometry at CS is preserved at AS.[2] Hierarchical (c-command) relationships between the terminals at one level are reflected as hierarchical relationships between the terminals at the other level. We have called this the Isomorphic Linking Hypothesis, or ILH. The formulation in (7) in the Introduction is repeated in (6):[3]

(6) **Isomorphic Linking Hypothesis (ILH)** (preliminary version)
The linking nodes at CS map isomorphically into the terminal nodes at AS.

Let us consider what this means for the mappings between CS and the syntax.

The simplest case is shown in (7a), with three linking arguments in CS and three corresponding positions in AS. The highest argument in CS links to the highest position in AS and the lower CS arguments links to the lower AS slots.[4] The linkings in (7b) and (7c) are not allowed because the structural relations in CS are not mirrored in AS.

(7)



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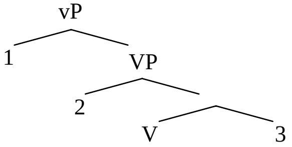
internal arguments. In frameworks that argue for flatter structures, for example, Emonds (2000), the same c-command relation holds between the external argument and other arguments.

(i)



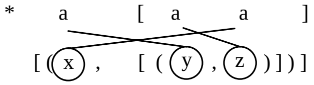
[2] The primitive geometric relation in trees is c-command (though some have questioned whether it can be derived from even more general principles of grammar. See Epstein (1999)).

[3] Formally, an isomorphism *h* from a (sub)tree A into a (sub)tree B is a mapping from the nodes of A into the nodes of B that preserves tree geometry. Thus in particular, *a* commands/dominates/(etc.) *b* in A iff *h*(*a*) commands/dominates/(etc.) *h*(*b*) in B.

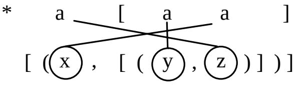
As mentioned in the Introduction, the ILH will undergo one final revision in Chapter 5, Section 3. The roots of this principle can be found in Ostler (1979) and Carrier-Duncan (1985). For other geometric approaches to Argument Structure, in other frameworks, see Grimshaw (1990), Hale & Keyser (2002), and Borer (2005), among others. For a recent review of many of these approaches, see Levin and Rappaport Hovav (2005).

[4] Since internal AS arguments are unordered and we have eliminated the direct-indirect distinction, (i) is an ill-formed equivalent of (b) and (ii) is an ill-formed equivalent of (c).

i.

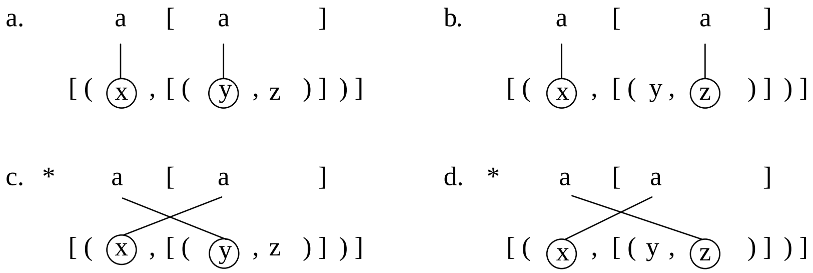


ii.



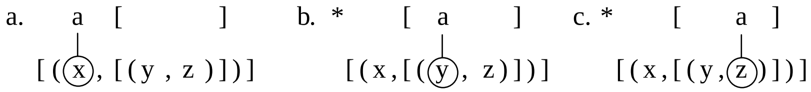
Now consider a CS in which only a subset of the terminals link. The relative level of the CS arguments that do link must be reflected in their AS geometry. When two arguments link, one higher than the other, the higher argument, x, must link externally and the lower argument, y or z, must link internally, as in (8a) or the structurally equivalent (8b). (8c) and (8d) are not permitted.

(8)


a. a [a]
[(x , [(y , z)])]
b. a [a]
[(x , [(y , z)])]
c. * a [a]
[(x , [(y , z)])]
d. * a [a]
[(x , [(y , z)])]

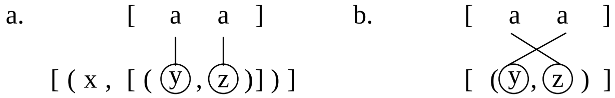
In the same CS configuration, if only the highest argument links, it also must link externally. So (9a) is permitted but (9b) or the equivalent, (9c) is not. It does not matter that no other argument links. Because the linking argument is higher in CS than the other arguments, the CS geometry is preserved if, and only if, it links internally.

(9)


a. a [ ]
[(x , [(y , z)])]
b. * [a]
[(x , [(y , z)])]
c. * [a]
[(x , [(y , z)])]

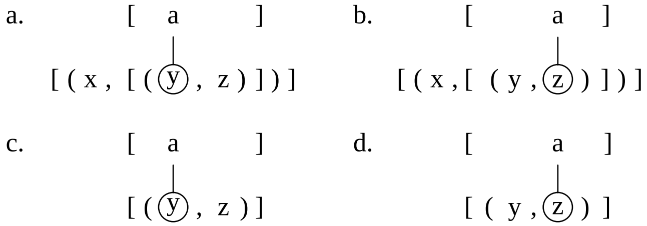
Two equally embedded CS arguments must both link internally, as in (10a) or the equivalent (10b).

(10)



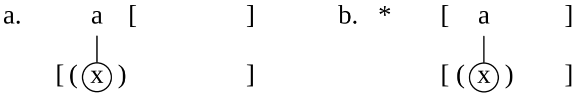
Again, if only one of them links, it will also link internally, as in (11). As above, (a) is equivalent to (b), (c), to (d).

(11)



Finally, consider a CS with one linking argument. As in (9), this linking argument has no sister argument (linking or not), so it should link to the AS position that has no possible sister, the external argument slot, as in (12a). (The internal a in (b) has a potential sister in the 3-argument template: a [a a].)

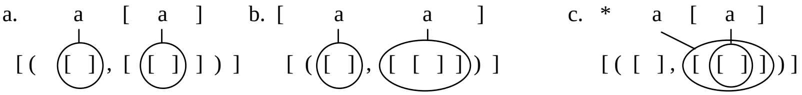
(12)



But unlike the single argument linking in (9), this argument is also the lowest CS argument, which would argue for internal linking. As we will see in Section 3.4 of this chapter, the cases that appear to have just a single argument in CS actually have a more complex geometry, parallel to (9), with the linking argument higher than the other CS elements. They will therefore link externally, as in (12a). For now, until we discuss them below, we will abbreviate such cases, representing them as in (12a).

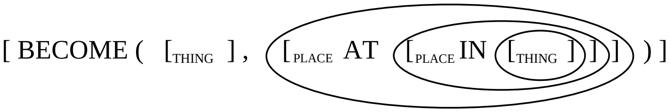
There are more complex CSs to consider, which we will turn to in Chapter 5. In this chapter, we will focus on how the ILH works for simple CSs. But before considering specific CSs in detail, notice that for every CS, the ILH disallows the simultaneous linking of two nested CS constituents. AS must mirror CS, but a verb's syntactic arguments cannot be nested; AS is made up of distinct positions. Thus (13a,b) are permissible linking patterns but (13c) is not.

(13)



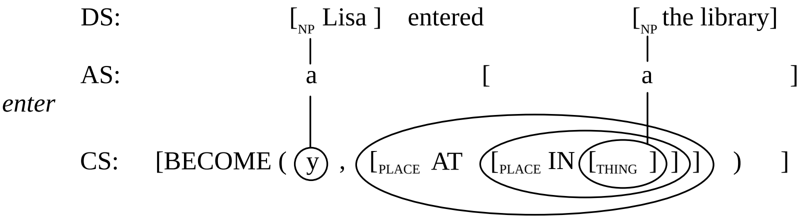
So in a CS with a complex PLACE like (14), only one of the three nested constituents can link.

(14)



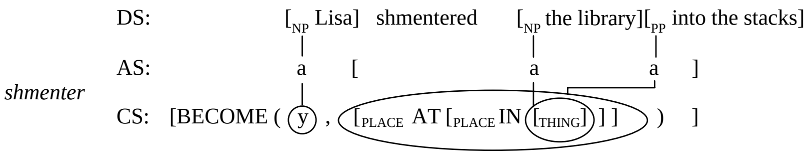
An example is the verb *enter*, in (15), discussed in Chapter 2, with three nested constituents. It links the innermost THING, in addition to a higher – but non-nested – THING, y.

(15)



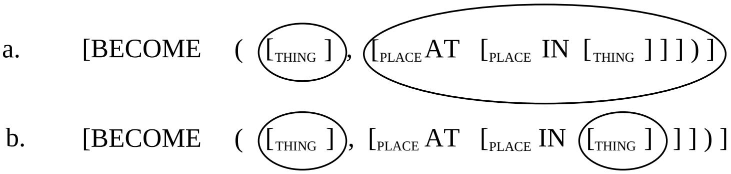
But there can be no verb similar to *enter* – call it “*shmenter*” – which links both its outer PLACE **and** the THING inside it:[5]

(16)


DS: [NP Lisa] shmentered [NP the library][PP into the stacks]
AS: a [a a]
shmenter
CS: [BECOME (y , [PLACE AT [PLACE IN [THING]]])]

Notice, however, that a single verb can have more than one realization, as in (17). In (a), the THING theme and a PLACE link; in (b) the THING theme and the embedded THING link:

(17)


a. [BECOME ([THING] , [PLACE AT [PLACE IN [THING]]])]
b. [BECOME ([THING] , [PLACE AT [PLACE IN [THING]]])]

When we look at specific verbs below, we will see cases along these lines.

The Isomorphic Linking Hypothesis is stated as a relation between CS and AS. But since AS is just an interface between CS and DS, the entry point to the syntax, the ILH is actually a relation between CS and DS. The AS-DS mapping need not be mentioned, since the Theta Criterion, reformulated in Chapter 1 (26), and repeated in (18), guarantees a one-to-one correspondence between AS and DS constituents.

(18) **Theta Criterion**

Within the argument structure of a predicate,

a. each argument must thematically license one and only one syntactic constituent and

b. a syntactic constituent may saturate one and only one argument

Further constraining all syntactic outputs are the Extended Projection Principle, which ensures that all arguments are expressed throughout a derivation,[6] principles of case assignment, and general syntactic principles of phrase structure.

---

[5] Compare this sentence with the grammatical *She entered the library through the main door* in which [$_{PP}$ through the main door] is not a linking argument but an adjunct. Since the ILH is a hypothesis for CS constituents that link to argument positions, it does not regulate CS constituents that do not link but are realized as adjuncts. We return to adjuncts in Chapter 4.

[6] The EPP, as formulated in Chomsky (1982:8), is stated in terms of the theta marking properties of each lexical item. In terms of CS representations, the theta marked elements are those that link. Implicit CS elements are not theta marked and do not have to be represented at any other level.

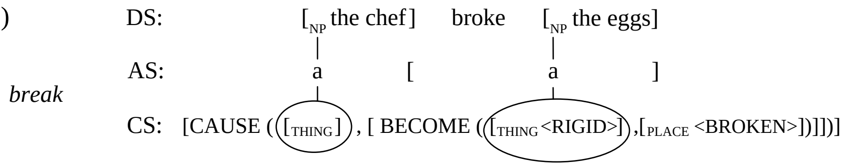
To see how the ILH works for particular verbs, we will first consider a range of causative verbs, with two or more arguments. These will provide a basis for comparing the ILH with other linking theories. Later in the chapter, we will look at how the ILH works for single argument verbs.

3.2 Causative Verbs

3.2.1 Simple Causative Verbs

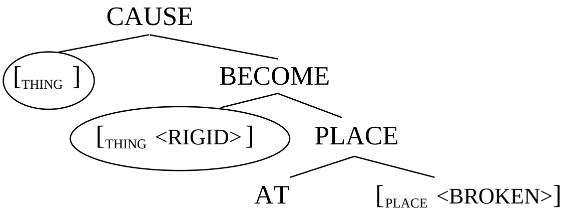
Consider, first, a transitive causative like *break*, in (19).

(19)


DS:
[NP the chef]
broke
[NP the eggs]
AS:
a
[
a
]
break
CS:
[CAUSE ([THING]), [BECOME ([THING <RIGID>]) ,[PLACE <BROKEN>])]])]

The tree notation in (20) shows the hierarchical relations more clearly:[7]

(20)



Two CS arguments link. Following the ILH, the less embedded one, the first argument of CAUSE (the agent), links to the less embedded, external, AS position. The more deeply embedded THING theme, with the selectional restriction

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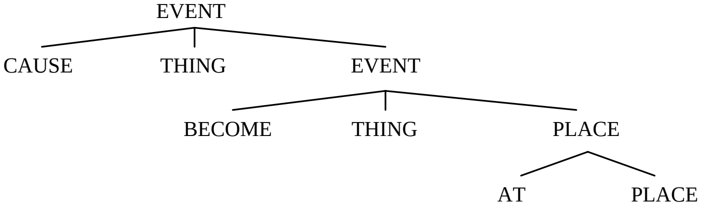
[7] This tree is simplified. As more complete version, such as (i), from Jackendoff (1990) would contain EVENT nodes above the function nodes, and those function nodes would be sisters of their arguments:

(i)

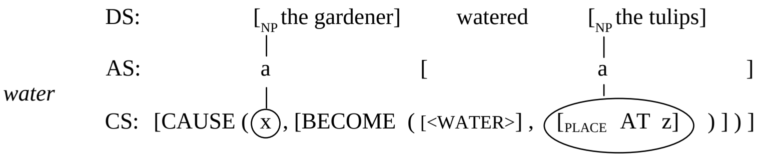


Since these simplifications do not affect the relative level of embedding of the linking arguments, we will continue to make them throughout.

<RIGID> on it, links to the internal AS position. In this version of *break*, the goal, represented here by [$_{\text{PLACE}}$ <BROKEN>], is an implicit argument that does not link.[8] The ILH thus guarantees that *the eggs* links internally, and prevents this CS from having the syntax of our impossible verb, *shmeak*, in (1b).

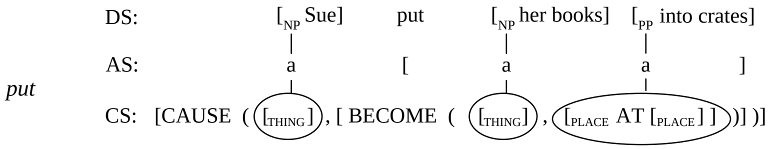
Transitive causative *water* links in a similar way, only this verb has a non-linking theme, [<WATER>]. Again, the agent, x, links externally, since it is less embedded than the goal, [$_{\text{PLACE}}$ AT z].

(21)

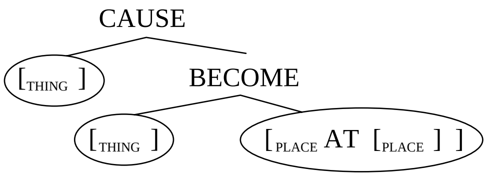


A third type of causative verb is *put* in (22), its CS shown in tree form in (23). Assuming that it links three arguments to the syntax, the ILH guarantees that the agent links to the external position and the equally embedded theme and goal link to equally embedded internal positions.[9]

(22)


DS:
[NP Sue]
put
[NP her books]
[PP into crates]
AS:
a
[
a
a
]
put
CS:
[CAUSE ([THING] , [BECOME ([THING] , [PLACE AT [PLACE]])])]

(23)



But now, without the direct/indirect argument distinction, what guarantees that the AS argument linked to the THING theme shows up as the direct object in D-Structure? That is, what prevents (24b) from being grammatical alongside (24a)?

(24) a. [$_{\text{NP}}$ Sue] put [$_{\text{NP}}$ her books] [$_{\text{PP}}$ into crates]
b. *[$_{\text{NP}}$ Sue] put [$_{\text{PP}}$ into crates] [$_{\text{NP}}$ her books]

---

[8] When the PLACE of *break* is specified as linking, <BROKEN> operates as a selectional restriction on it: *She broke the cookie into pieces/*into a whole*.

[9] In Chapter 7, after we introduce Clausal Fusion, we will be revising this analysis of *put* and other verbs standardly assigned two internal AS arguments, including *go*. The new analysis, also consistent with the ILH, will more accurately predict subtleties in the behavior of these verbs.

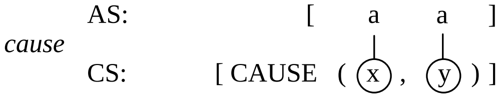
As outlined earlier, linear order and category follow from s-selection and Case Theory. THINGs are typically NPs, and NPs need case. PLACEs are typically PPs. Only (24a) satisfies these conditions.

Consider now the simple transitive verb *cause* in (25). At first glance, this appears to be a counterexample to the ILH.

(25) Campers caused the forest fire.

If the CS of *cause* consisted of CAUSE plus two THING arguments, represented in (26) as x and y, then *cause* would be unaccusative according to the ILH, since x and y would be on the same CS level, embedded equally under CAUSE.

(26)



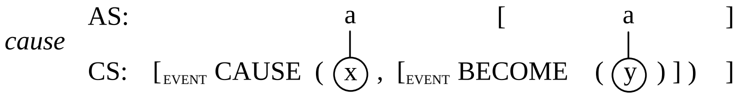
However, following Jackendoff (1990), we believe that the second argument of the primitive function CAUSE is not a THING but an EVENT. Supporting this is the fact that only NPs that designate processes and events – not things – can serve as the direct object of *cause*.[10]

(27) a. The students caused the riot.
The terrorist caused the explosion.
A cheating scandal caused a careful examination of the students.
The premature death of the actress caused the publication of her biography.

b. *The students caused the music.
*The terrorist caused the explosives.
*A cheating scandal caused a new test.
*The premature death of the actress caused her biography.

Cause, then, means something like "cause to happen or to come into being". We represent this crudely in (28), with an embedded BECOME.

(28)



The transitive linking of *cause* is now compatible with the ILH: y is more deeply embedded than x and their relative level of embedding is mirrored by the AS positions they are linked to. This analysis extends to verbs of creation, for example, the verb *create* itself and verbs such as *write* and *paint* in their creation senses (e.g., *she wrote a sonnet; she painted a portrait*). These verbs essentially mean "x cause y to come to be in existence.” Again, the causer (x) is less deeply embedded in CS than the created entity (y), so the ILH correctly predicts transitive linking.

---

[10] See Pustejovsky (1995) for an extensive discussion of event-denoting nominals.

3.2.2 Productive “double agent” Causative Verbs

Independent evidence for the ILH comes from other languages, for example, productive causative formation rules in languages such as Tagalog. In that language, prefixing *pa-* to a verb such as *lagay*, ‘put’, creates a new verb, *pa-lagay*, ‘cause to put’, as shown in (29). (30) contains glosses for the grammatical morphemes in the Tagalog examples below, most of which come from Carrier-Duncan (1985).[11]

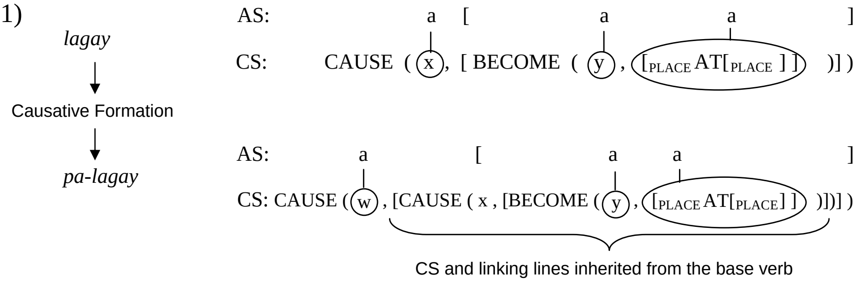
(29) a. Nag-lagay ang bata ng saging sa kahon.
nag-put ang child ng banana sa box
‘The child put the banana into the box.’

b. Nag-**pa**-lagay ang lalake sa bata ng saging sa kahon.
nag-**cause**-put ang man sa child ng banana sa box
‘The man caused the child to put the banana into the box.’

(30) nag = prefix indicating that the topic of the sentence is external
um = infix indicating that the topic of the sentence is external
ang = particle that precedes the topic of the sentence
ng = particle that precedes an internal argument that needs case
sa = generic preposition for AT or internal argument or adjunct (assigns case)
? = nondistinctive glottal stop for underlyingly vowel-initial verb stems
pa = ‘cause’ or ‘let’, depending on pragmatics
nag / um choice depends on class

The CS and AS of the input and output verbs are shown in (31):

(31)


lagay
Causative Formation
pa-lagay
AS: a [a a]
CS: CAUSE (x , [BECOME (y , [PLACE AT[PLACE]])])
AS: a [a a]
CS: CAUSE (w , [CAUSE (x , [BECOME (y , [PLACE AT[PLACE]])])])
CS and linking lines inherited from the base verb

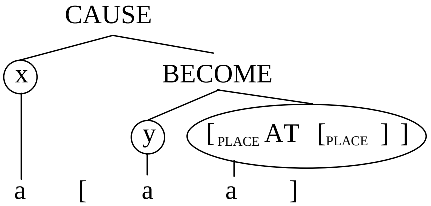
Like English *put*, the CS of the base verb *lagay* is headed by CAUSE, and takes two arguments, the first, a THING, x, the second, an entire BECOME clause. The CS of the derived causative *pa-lagay* ‘cause to put,’ is created by embedding the CS of the base verb as the second argument of a new, higher CAUSE function, whose first argument is a new agent, w. The derived verb, which means ‘w causes x to cause y to come to be at a PLACE’ has two agents, so we will call it a “double agent causative.”

---

[11] See Travis (2000) for a more recent analysis of similar data.

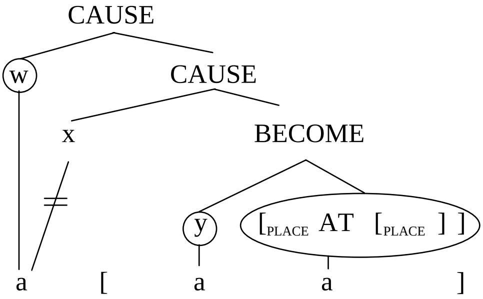
The ILH accounts for the linking of both the basic and derived CSs in (31). The base verb *lagay* links just like *put*. As shown in tree notation in (32), the least embedded CS argument, x, links to the external AS argument.

(32)



To derive the new causative verb, w is added and the CS of the input verb is inherited along with linking lines (following Carrier-Duncan, 1985). But the ILH requires that w, now the least embedded CS argument, link to the external argument. And now there is a problem. x is less embedded than the y and PLACE arguments of BECOME but AS has no more layering to reflect this relative CS prominence. One solution, the one taken in Tagalog, but not all languages, as we will see shortly, is for the delinked x to lose its linking circle rather than relink at the expense of another argument, as shown in (33).[12]

(33)



x is then no longer an argument, but is realized as an adjunct (the NP *bata* is marked with the adjunct marker, *sa*, in (29b)), comparable to the *by*-phrase in an English passive. Under this solution, the relative prominence of the CS arguments is reflected in AS, as the ILH requires.

The same delinking happens for two-argument verbs like *break* in (34). The verbal infix, *um* in (34a), and the verbal prefix, *nag* in (34b), indicate that the topic in each sentence, marked with *ang*, is the external argument. The internal argument is marked with *ng*. After Causative Formation has applied, in (34b), the demoted original agent *bata* is marked with the adjunct marker, *sa*.

---

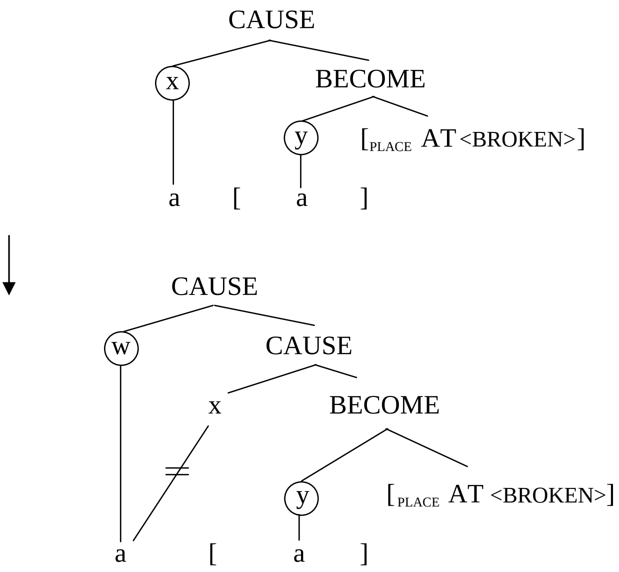
[12] This pattern is also found in Japanese (Williams, 1981) and appears to be a common one in languages of the world, according to Baker (1998), who cites Chichewa, Turkish, Jacaltec, French and Malayalem.

(34) a. B-um-ali ng tubo ang bata
um-broke ng sugarcane ang child
'The child broke the sugarcane.'

b. Nag-pa-bali ng tubo sa bata ang lalake
nag-cause-break ng sugarcane sa child ang man
'The man let the child break the sugarcane.'

As (35) shows, although AS **could** have a second *a* position, allowing x to relink as an internal argument, it does not, since if both x and y linked internally this would not reflect their relative levels of CS embedding. So here, too, x loses its linking circle.

(35) Tagalog Causative Formation for a 2-argument verb (“*break*”)



Notice that this is not the case for causatives formed from 1-argument verbs like *cry*, as shown in (36)–(37).[13] *Cry* has no inherited internal arguments; the delinked x relinks internally and satisfies the ILH.

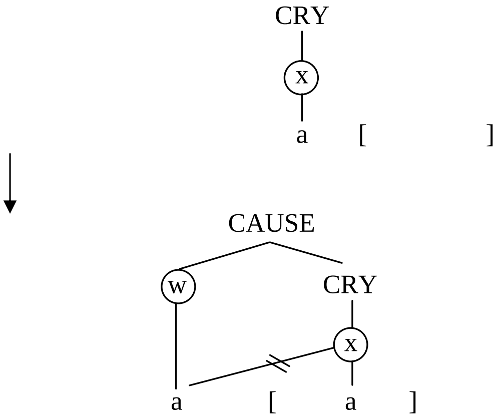
(36) a. ?-um-iyak ang bata
?-cry ang child
'The child cried.'

---

[13] The CS for unergative verbs is slightly more complex as will be discussed below, in Section 3.4 of this chapter. But linking is not affected, since the relevant CS geometry is the same.

b. Nag-pa-iyak ng bata ang lalake
nag-cause-cry ng child ang man
‘The man caused the child to cry.’

(37) Tagalog Causative Formation for 1-argument verb (“*cry*”)



The way that Causative Formation works in Tagalog shows that linking lines are inherited under word formation in this language, since the presence or absence of an internal argument in the base verb determines whether or not the demoted agent relinks in the derived verb. For *break*, the delinked external argument x does not relink internally because there is already an internal argument inherited from the input and relinking to another internal argument position would violate the ILH. But for *cry*, which has no internal argument to be inherited, the delinked x relinks to an internal position. It is important to note that the cases in which relinking does not take place do not contradict the ILH, because it constrains only how **designated** CS constituents link to AS.

A similar process appears to hold in Chichewa dialect “A”, described in Baker (1988:162–163), as shown in (38). (SP is the subject agreement prefix; OP, the object agreement prefix.)

(38) Anyani a- na- **wa**- meny -ets -a **ana** kwa buluzi.
baboons SP- PAST- **OP**- hit -CAUS -ASP **children** to lizard
‘The baboons made the lizard hit the children.’

The delinked base subject, *lizard*, is attached in a PP (parallel to a *by*-phrase adjunct)[14] and the inherited object (*children*) continues to trigger object agreement.

---

[14] It is obliquely marked and is “relatively inert syntactically”. As Baker shows, it cannot be the subject of a passive and cannot trigger object agreement (Baker, 1985:189).

What happens after delinking in transitives is different in Chichewa dialect-B, (Baker, 1988:164–167, citing Trithart, 1977).[15] In (39) is the output of Causative Formation applied to transitive *harvest*.

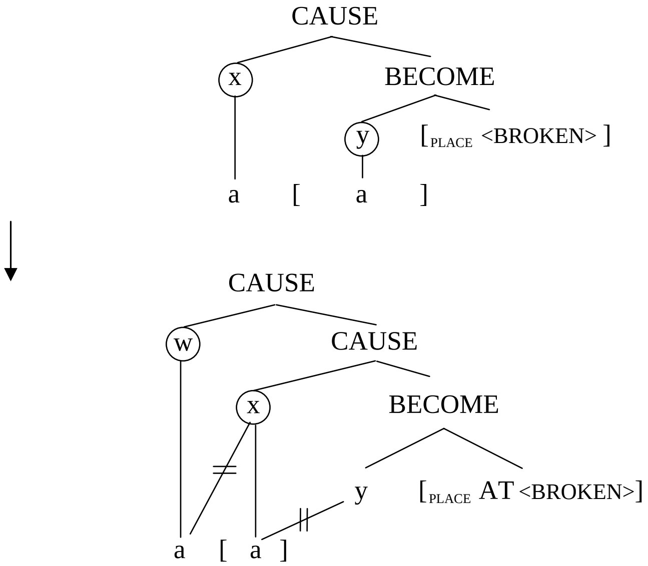
(39)

Catherine	a-	na-	**mu-**	kolol	-ets	-a	**mwana**	**wake**	chimanga.
Catherine	SP-	PAST-	**OP-**	harvest	-CAUS	-ASP	**child**	**her**	corn

‘Catherine made her child harvest the corn.’

After the agent argument (*her child*) is delinked from the external position, it relinks to an internal argument position, from which it delinks any other inherited linked internal argument. This demoted constituent can then be added as an adjunct. Baker demonstrates that the base verb’s object, *corn*, though morphologically unmarked, has been demoted to an oblique NP, without the privileges of argumenthood (for us, an adjunct).[16] Graphically, the derivation looks like (40). (We use *break* to allow a direct comparison with (32)).

(40) Chichewa-B Causative Formation for a 2-argument verb (eg, “*break*”)



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[15] The same holds for Chamorro, Cebuano, Choctaw, Chimwini, and most members of the Bantu language family, as described in Baker (1988:165).

[16] Like the demoted oblique object in Chichewa-A, this NP also cannot be the subject of a passive or trigger object agreement. Baker also faces the standard problem of explaining how this second NP gets case. Noting that this is an area where languages differ idiosyncratically, he proposes several marked types of case assignment.

This kind of linking "musical chairs" is the other possible outcome permitted by the ILH. While lower than the newly added agent, the delinked x is still higher in CS than the other inherited argument, y. When it relinks, it dislodges y, preventing it from being at the same AS level. y does not relink, and the new verb has only two arguments.[17]

Note that this dialect, with intransitive verb inputs, as in (41b), behaves just like Tagalog in (37) and Chichewa-A in (41a). As predicted, the original external argument is delinked and, given the ILH, can be relinked to the internal position. Following Baker, the derivations for both dialects in (41) would look something like (42).

(41) a. Chichewa-A

Buluzi	a-	na-	**wa-**	sek	-ets	-a	**ana**.
Lizard	SP-	PAST-	**OP-**	laugh	-CAUS	-ASP	**children**

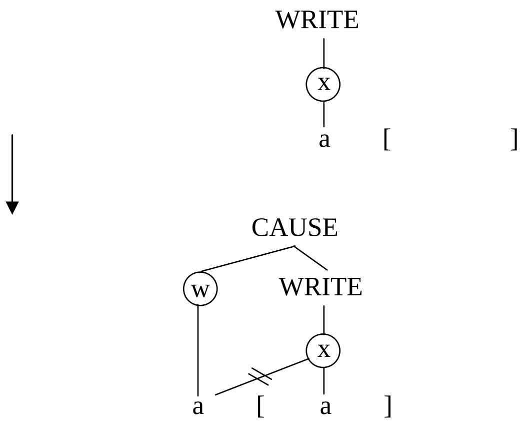
'The lizard made the children laugh.'

b. Chichewa-B

Mphunzitsi	a-	na-	**wa-**	lemb	-ets	-a	**ana**.
teacher	SP-	PAST-	**OP-**	write	-CAUS	-ASP	**children**

'The teacher made the children write.'

(42) Chichewa-A/B Causative Formation for a 1-argument verb ("*write*")



So for languages with a productive "double" causative rule, the ILH not only handles, but makes sense of the "demotion" of the original agent and the fates of the other arguments. The relative levels of the CS arguments are reflected in the relative levels of their AS counterparts. Where that cannot be maintained, the link to AS is dropped, and the CS constituents either remain unexpressed (i.e., implicit) or are expressed as adjuncts.

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[17] Notice that languages taking this relinking option do not require the assumption that linking lines are inherited. Fresh linking lines consistent with the ILH could just as well be drawn from scratch. See Baker (1988) for further discussion of these two types of causative languages in a syntactic incorporation framework.

3.3 Comparing the ILH to Other Linking Theories

While it is clear that the ILH (in (43), repeated from (6) in Section 3.1, above) solves a number of linking puzzles crosslinguistically, it is not clear that it is a better linking theory than either of the two standard approaches to linking, the Thematic Hierarchy Hypothesis, THH, and the Uniformity of Theta Assignment Hypothesis, UTAH.

(43) **Isomorphic Linking Hypothesis** (preliminary version)
The linking nodes at CS map isomorphically into the terminal nodes at AS.

To show that it is, we will first lay out those theories. And in order to characterize them as they have been proposed, we will temporarily revert to theta role labels and re-introduce the direct/indirect argument distinction.[18]

3.3.1 The Thematic Hierarchy Hypothesis (THH)

According to the THH there are two universal hierarchies, one of thematic roles and one of syntactic arguments, as in (44a).[19] A THH Linking Rule, (44b), lines up a given verb's thematic roles on the Thematic Role Hierarchy and links them in autosegmental fashion, one to one, with positions on the Syntactic Argument Hierarchy. The output of this process is the verb's AS.

(44) **Thematic Hierarchy Hypothesis**

a.

Thematic Role Hierarchy	Syntactic Argument Hierarchy
agent	a [. . .]
theme	. . . [. . . $\underline{a}$ . . .]
{goal/source/location}	. . . [. . . a . . .]

---

[18] Versions of the THH go by various names. See Ostler (1979), Carter (1976), Carrier-Duncan (1985) and Jackendoff (1990). UTAH is presented in Baker (1988, 2001). See Levin and Rappaport Hovav (2005) for a recent review of these and other approaches.

[19] The Thematic Role Hierarchy has been proposed in different versions, using slightly different notations, but all of them include the disjunction {goal, source, location}. For example Jackendoff (1972) uses Agent > Location/Source/Goal > Theme; Grimshaw (1990) uses (Agent (Experiencer (Goal/Source/Location (Theme)))). The syntactic argument hierarchy has also been stated in terms of grammatical relations (subject > direct object > indirect object) and case relations (nominative > accusative > oblique). It is also possible to use D-Structure configurations ([NP,IP] > [NP,VP] > [NP, PP]).

b. THH Linking Rule
Link each of a verb's theta roles to a syntactic argument, one to one, from the highest position on each hierarchy to the lowest. No many-to-one associations. No line-crossing.

To make it possible to compare the THH with the ILH, (45) translates the THH into our terms and incorporates the innovations we argued for above.

(45) a.

Thematic Role Hierarchy	Syntactic Argument Hierarchy	
[$_{\text{THING}}$] in CAUSE ([$_{\text{THING}}$], . . .	a	[. . .]
[$_{\text{THING}}$] in BE(COME) ([$_{\text{THING}}$], . . .	. . .	[. . . a . . .]
[$_{\text{PLACE}}$]	. . .	[. . . a . . .]

b. THH Linking Rule
Link each THING and PLACE in CS to an AS position, one to one, starting from the highest position on each hierarchy to the lowest. No many-to-one associations. No line-crossing.

Notice that these changes to the THH are improvements. First, there are fewer primitives. Second, the original THH cannot explain why goal, source, and location pattern together. Goals could just as well pattern with themes instead of sources and locations. Here, by dropping the direct/indirect internal argument distinction and by making the argument of the verb the XP corresponding to the goal/source/location, not the NP inside it, we have an explanation. The three roles form a "natural" CS class, because they are all subcomponents of PLACE. That they fall together need not be stipulated.

3.3.2 The Uniformity of Theta Assignment Hypothesis (UTAH)

A second hypothesis concerning linking regularities is exemplified by Baker's (1988) Uniformity of Theta Assignment Hypothesis, or UTAH.[20]

(46) **Uniformity of Theta Assignment Hypothesis (UTAH)**
Identical thematic relationships between items are represented by identical structural relations between those items at the level of D-structure.
(Baker, 1988:46)

According to the three linking rules in (47), each thematic role has a consistent grammatical realization.[21] (Again, we temporarily re-introduce theta role labels and the direct/indirect internal argument distinction.) Notice that these three rules do not follow from general principles; they must be added as stipulations in that framework.

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[20] The linking rules of Levin & Rapoport (1988), Levin & Rappaport Hovav (1995), and Rappaport Hovav & Levin (1998a, 2001) (their Canonical Correspondence Rules) also map particular thematic roles onto specific argument positions. See Baker (2001) for a weakening of UTAH to accomodate some difficulties.

[21] For expository purposes, we are using a rule based on Agent rather than Immediate Cause (Levin & Rappaport, 1995) or Actor (Jackendoff, 1990), which have better coverage of the data. But since our arguments against a UTAH-style theory are not about the coverage of the particular linking rules, they apply just as well to these alternatives.

(47) Linking rules under UTAH

a. Agent rule
Link agent to: a [. . .]
b. Theme rule
Link theme to: . . . [. . . $\underline{a}$ . . .]
c. Goal/Source/Location rule
Link goal,source, or location to: . . . [. . . a . . .]

Translating it into our framework, we get (48).

(48) UTAH stated in CS terms

a. Agent rule
Link $[_{\text{THING}}\ ]$ in CAUSE ($[_{\text{THING}}\ ]$, . . . to: a [. . .]
b. Theme rule
Link $[_{\text{THING}}\ ]$ in BE(COME) ($[_{\text{THING}}\ ]$, . . . to: . . . [. . . a . . .]
c. Goal/source/location rule
Link $[_{\text{PLACE}}\ ]$ to: . . . [. . . a. . .]

Now a simplification is possible. Since themes and PLACEs both link to an internal argument, (48b, c) can be collapsed into one rule that links any argument of BE(COME) to an internal argument, as in (49).

(49) UTAH reformulated in CS terms:

a. Agent rule
Link the first argument of CAUSE to: a [. . .]
b. Non-agent rule
Link any argument of BE(COME) to: . . . [. . . a . . .]

(49) is an improvement over (47). It has fewer primitives and fewer rules. And eliminating the arbitrary disjunction “goal/source/location” is an even more significant improvement to UTAH than it was to THH. Under (47), it must be stipulated that theme links to direct internal argument and goal/source/location links to indirect internal argument. It could just as easily have been the other way around:[22]

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[22] If it were, instead of *put* in (i), the language would contain verbs with the opposite linking pattern, as in (ii).

(i) John put dishes on the table.
(ii) John shput the table of dishes.

One could claim that this is the linking pattern for *cover* and *clear*, assuming that *the table* is a goal in (iii) and a source in (iv):

(50) An unattested but conceivable linking pattern under UTAH

a. Agent Rule
Link the first argument of CAUSE to: a [. . .]
b. Theme Rule
Link the first argument of BE(COME) to: . . . [. . . a . . .]
c. Goal/Source/Location Rule
Link the {goal/ source/ location} to: . . . [. . . $\underline{a}$ . . .]

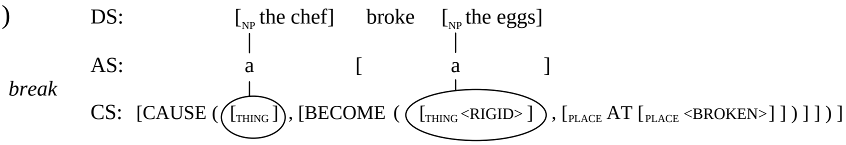
But under (49), once the direct/indirect internal argument distinction is eliminated, this stipulation is unnecessary.

3.3.3 Why the ILH Is a Better Linking Theory than THH and UTAH

With the three linking theories stated in the same terms, it is now possible to see why, even with the improvements in THH and UTAH, the ILH is a superior approach. Let us begin with the verbs we have discussed under the ILH.

For causative verbs like *break*, *water*, and *put*, THH will map the agent to external argument. The lower thematic roles that link will map to internal positions. For these verbs, THH links the same way as the ILH.

(51)


DS: [NP the chef] broke [NP the eggs]
AS: a [a]
break
CS: [CAUSE ([THING]), [BECOME ([THING <RIGID>] , [PLACE AT [PLACE <BROKEN>]])]])]

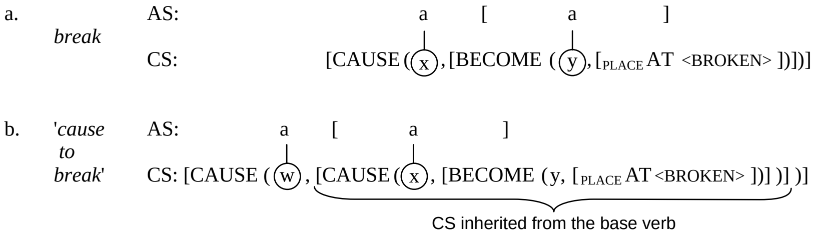
Similarly, under UTAH, agent links to external argument and the other argument(s) to internal position(s). So for verbs with one agent, the three theories make the same predictions.

But now consider double agent causatives. The derivation of ‘cause to break’ in Tagalog and Chichewa-A is repeated in (52). For Chichewa-B, x relinks to the internal argument position and y is delinked. (See (40), above.)

(iii) John covered the table with dishes.
(iv) John cleared the table of dishes.

However, Rappaport & Levin (1995) argue that *the table* in (iii) and (iv) is a theme, because it undergoes a change of state. (*The table* also has a secondary thematic role, a topic we will take up in Chapter 7.)

(52)


a. break
AS: a [a]
CS: [CAUSE (x), [BECOME (y), [PLACE AT <BROKEN>])])]
b. 'cause to break'
AS: a [a]
CS: [CAUSE (w), [CAUSE (x), [BECOME (y, [PLACE AT <BROKEN>])])])]
CS inherited from the base verb

Both THH and UTAH run aground. For THH, stipulating that agent occurs at the top of the Thematic Hierarchy has nothing to say about what happens when there are two agents. And UTAH's Agent Rule also does not say what happens when there is more than one agent.

One early proposal about these verbs claimed that adding a new agent causes the old agent to change its theta role to either theme or goal, depending on the other theta roles that the base verb already has (Williams, 1981). This could be incorporated into either THH or UTAH: after delinking, the old agent could relink according to its new thematic role. But as Carrier-Duncan (1985) has pointed out, there is no evidence for this "theta mutation". In fact, it contradicts what the new verb means. For double agent causative *break*, "w causes x to cause y to become broken," x is still understood as causing y to break. The new verb inherits the meaning of the base verb intact. Moreover, allowing word formation rules to change thematic roles in this arbitrary way would significantly weaken the theory of word formation. Under the ILH, in which thematic role labels are names for structural relations, theta roles cannot be arbitrarily mutated. In the process of word formation, when a CS is inherited into the CS of a new word, thematic roles can be embedded under new CS material. But the roles can neither disappear nor be transfigured. So far, then, not only does the ILH handle double agent causatives while THH and UTAH do not, its geometrical approach actually explains why delinking occurs. It is not a matter of stipulation, but follows from the depth of embedding in CS.

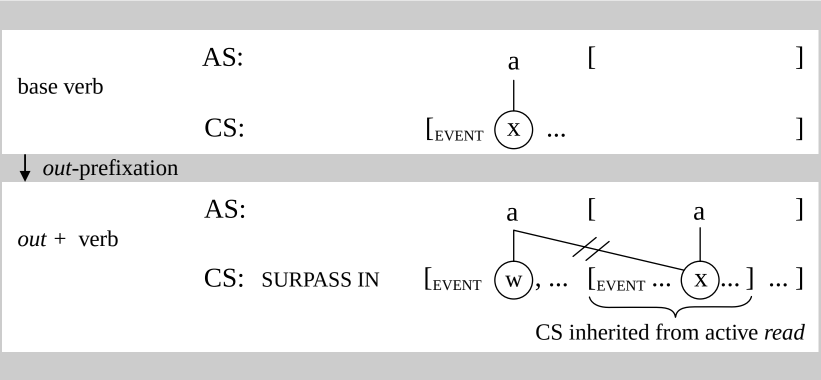
The demotion of a CS constituent triggered by embedding one CS into another is not unique to causative rules. It can be triggered by any lexical process that adds higher CS material to the CS of a base verb. Here, too, the ILH is preferable to THH and UTAH. *Out*- prefixation, which we briefly encountered in Chapter 1, operates on intransitive verbs like *sing* and *run*, as shown in (53).

(53) a. The soprano sang.
Bill ran.

b. The alto outsang the soprano.
John outran Bill.

Though we will not propose a complete CS for *out*- here, "w outverbs x" means roughly, "w surpasses x in VERBing," where a newly-added argument (w) is higher in CS than the argument inherited from the input verb, (x). According to the ILH, as shown in (54) the new argument, here, (w), must link to the external AS position. This forces the inherited argument, (x), to delink from that position. It then relinks internally.

(54)



Even without full-blown LCSs, it is easy to see that THH cannot give the right result. For the output to be correct, the newly added argument (which is not an agent, since the new predicate is not CAUSE) would have to be higher on the thematic hierarchy than the argument of the input verb. But there is nothing higher than agent on the THH hierarchy, so there is no possible output for unergative inputs (*sing*, *run*).[23] UTAH is also inadequate. The input verb's theta role, agent, is linked to the external argument. When the CS of that verb is inherited into the new CS, so will its theta role and corresponding AS linking. The agent of *sing* would incorrectly be the external argument in *outsing*, not the internal argument. The ILH, though, gives the right result, whatever the input, since particular thematic roles and positions in AS do not matter. All that matters is the relative hierarchical positions of the CS arguments. In Chapter 4 we will see how the ILH correctly handles other word-formation processes that embed one CS inside another and demote a CS constituent (e.g. the *spray*/*load* alternation).

There is a third way in which the ILH is preferable to THH and UTAH. As we mentioned above, in both of those theories, it is a stipulation that agent links to the external argument position. In THH, agent is at the top of the Thematic Role Hierarchy, but it is not clear how this ranking can be taken as primitive. Since the ranking does not follow from independent (geometric) principles, agent could just as easily occur at the middle or the bottom of the list, and turn up as an internal argument. In UTAH, a specific Agent Rule links agent to external argument. But a rule linking theme to external argument would be just as easy to state. That is, UTAH does not explain why the linking rules are not those in (55).

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[23] There is another version of *run* which is unaccusative. But *run* in (53a) is clearly unergative, since it passes the *-er* test, which only unergatives do: Bill is a *singer, runner, giggler*, **faller*, **arriver*, **appearer*.

(55) An unattested but conceivable linking pattern under UTAH
a. Link the theme to a [. . .]
b. Link all other CS arguments to . . . [. . . a . . .]

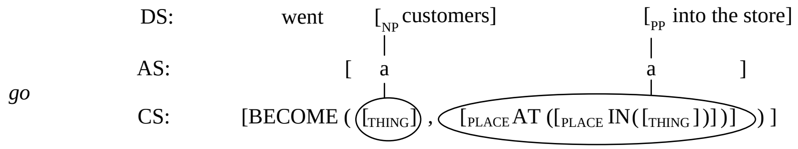
In contrast, for the ILH, the linking of all theta roles, agents included, is relative, derivable from the hierarchical position in CS of one thematic role relative to others. Nothing needs to be stipulated, and agent is not a “privileged” theta role.[24]

A fourth advantage of the ILH over THH and UTAH is clear from the *go* and *enter* verb classes in (56), which we looked at briefly in Chapter 2, Section 2.1.[25]

(56) a. go, come, emerge, live
b. enter, occupy, exit, leave, cross, descend, inhabit

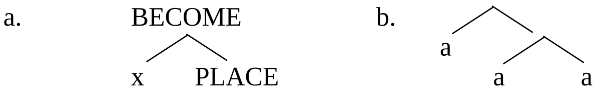
Recall that for the *go* class in (56a), as shown in (57), the two CS arguments that link are the theme and the outer PLACE, not the THING inside it:

(57)


DS:
went
[NP customers]
[PP into the store]
AS:
[a a]
go
CS:
[BECOME (([THING]) , ([PLACE AT ([PLACE IN([THING])])]))]

According to the ILH, because they are sisters in *go*’s CS, they must link to sister positions in AS.

(58)



That is, they must both link internally. The two arguments correspond to NP and PP, since the a position corresponding to the THING is satisfied by an XP that designates a thing, typically an NP, and the a position corresponding to the PLACE is satisfied by an XP designating a place, typically a PP.

(59) a. *[$_{\text{NP}}$ Customers] went [$_{\text{NP}}$ the store].
b. [$_{\text{NP}}$ Customers] went [$_{\text{PP}}$ into the store].

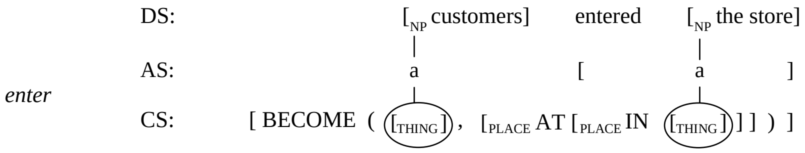
---

[24] Though their framework is different from ours, Hale & Keyser (1993) similarly propose that thematic roles follow from geometric properties of the building blocks of argument structures. Likewise, Gruber (2001) develops a theory arguing for the epiphenomenality of thematic hierarchies.

[25] *Live, inhabit* and *occupy* show the same contrast as the others in (a) and (b) but they are location verbs, not change-of-location verbs, based on BE not BECOME.

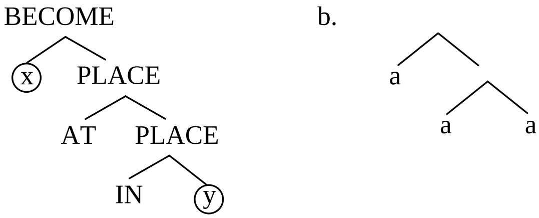
In contrast, for the *enter* class in (56b), shown in (60), the second argument designated to link is the THING inside the complex PLACE.

(60)



Schematically, the CS structure for *enter* is (61a), which must map into the AS template in (61b).

(61) a. b.



There is an additional level compared to the cases we have seen before. However, what matters is the structural positions of the linking arguments. Here the deeply embedded THING, y, is lower than the THING theme, x, thus, to preserve this geometric relation, the ILH requires y to link internally and x, externally.

The ILH thus correctly predicts that *go* is unaccusative but *enter* is not. And, in contrast to *go*, the internal argument position that this embedded THING, y, is linked to is satisfied by an NP. Thus we have (62a), not (62b).[26]

(62) a. [$_{NP}$ Customers] entered [$_{NP}$ the store].
b. *[$_{NP}$ Customers] entered [$_{NP}$ into the store].

This pair of verb classes poses problems for both THH and UTAH. THH claims that the highest theta role, which for both verbs is the theme, should link to the external argument position. It thus fails to predict the unaccusativity of the *go*-class verbs. UTAH has difficulty, instead, with the *enter* class, because it claims that themes should always be internal and thus incorrectly classifies this class as unaccusative.

As we already mentioned, we will return to the argument structures of these verbs in Chapter 7, where we will revise our analysis of *go* verbs (though the ILH will continue to correctly account for their linking). But there are two pieces of evidence supporting this linking difference that we can give here. First, *-er* suffixation applies only to verbs that take an external argument, for example, single-argument unergatives, (63a), but not unaccusatives, (63b) (Keyser & Roeper, 1984; Levin & Rapoport, 1988):

---

[26] *Enter* does allow a PP in *they entered into discussions*. We look at this below in Section 3.4.

(63) a. laughter, runner, talker, walker, drinker, crower, singer
b. *arriver, *occurrer, *appearer, *descender, *returner, *faller

Since the *go* and *enter* classes both require a complement, we must test them in *-er* constructions with a complement, either postverbal, or in a compound.[27] As predicted, *go*-class verbs, in (64), fail the test; *enter*-class verbs, in (65), pass it.

(64) a. *a goer of home
*a comer of home
*a liver of somewhere
b. *home-goer[28]
*home-comer
*somewhere-liver

(65) a. an enterer of contests
a leaver of parties
a crosser of deserts
a descender of staircases
b. contest-enterer
party-leaver
desert-crosser
staircase-descender

Second, evidence that *enter* has a D-Structure external argument as well as an internal argument comes from Nominal Formation. Recall from Chapter 2 that the *of*-NP in a nominal can correspond to the internal or external argument of the input verb.

(66) a. internal argument
The devouring *of vast quantities of junk food* takes no time at all.
For New Year's Eve parties, just the slicing *of the cheese* often takes two hours.
After heavy snowfalls, the clearing *of major roads* can take hours.

b. external argument
the rejoicing (*of the villagers*) lasted for days
the giggling (*of the excited campers*) lasted long into the night
the babbling (*of the babies*) lasted three hours

As (67) shows, NF applies to *enter*-class verbs in two ways, the *of*-NP corresponding either to the internal or the external argument.

(67) a. the entering of the customers . . .
b. the entering of stores (after hours) . . .

---

[27] Since *go*-class verbs require a PLACE and therefore cannot typically appear with NPs (*this way, that route* are among the few PLACE NPs, according to Jackendoff, 1990:77), it is hard to find bare NP candidates to test that are single words and, therefore, able to appear in compounds. *Home, somewhere*, and *someplace* are each possible with at least some of these verbs: *go/come home; live somewhere/someplace*.

[28] These contrast with *-ing* forms (*home-coming, sea-going*), which do not take an external argument. A few lexicalized grammatical *-er* forms exist (*church-goer, party-goer, theatre-goer, movie-goer*). But new forms are ungrammatical, as expected: **store-goer*, **film-goer*, **school-goer*, **library-goer*, **beach-goer*, **park-goer*, **playground-goer*, **daycare-goer*, **office-goer*, **work-goer*.

And NF applies to intransitive verbs that take an external argument, like *shop* in (68a). But the ungrammaticality of (68b) shows that *go* does not take an external argument.

(68) a. the shopping of the customers . . .
b. *the going of the customers (into stores)

In fact, this raises the possibility that *the customers* is not an internal argument of *go*, either, something we will return to in Chapter 7. But at this point, it is clear that the argument structures of the two classes are different, a fact that neither the THH nor UTAH can account for.

3.4 Unaccusative and Unergative Verb Linking and Some Linking Predictions

So far, we have seen how the ILH (repeated from (6) above), in (69), explains the linking of causative verbs: two arguments at different CS levels are linked to two positions at correspondingly different AS levels.

(69) **Isomorphic Linking Hypothesis** (preliminary version)
The linking nodes at CS map isomorphically into the terminal nodes at AS.

We now turn to verbs that have one linking argument, unergatives like *laugh* in (70) and unaccusatives like the change-of-state *break* class in (71).[29]

(70) She laughed.
She sang.
She sneezed.
She giggled.
She talked.
She walked.
She ran.

(71) The statues broke.
The pond froze.
The chocolate melted.
That sweater stretched.
The toast burned.

According to our tests, the *laugh* class is unergative – its argument links to the external AS position – and the *break* class is unaccusative – its argument links internally. Applying our first test, Resultative Formation (Carrier & Randall, 1992; Levin & Rappaport Hovav, 1995), to the *laugh* class, (72a), requires an overt postverbal NP to license predication between the postverbal XP predicate and a structurally eligible NP subject. Unaccusatives like (72b) require no NP, because a postverbal trace licenses predication (examples come from Carrier & Randall, 1992). [30,31]

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[29] These classes can be further subdivided, but those distinctions are irrelevant here.

(72) a. The children laughed *(themselves) giddy.
The sopranos sang *(themselves) hoarse.
The patient sneezed *(herself) silly.
The baby giggled *(itself) into a frenzy.
The teacher talked *(himself) blue in the face.
The tourists walked *(their shoes) ragged.
The jogger has run *(her Nikes) threadbare.

b. The statues broke (*themselves) into pieces.
The pond froze (*itself) solid.
The chocolate melted (*itself) into a gooey mess.
The sweater stretched (*itself) out of shape.
The toast burned (*itself) black.

Second, the *laugh* class passes the *-er* test, which requires an external argument. These forms contrast with the ungrammatical *-er* forms from the *break* class, as shown in (73).[32]

(73) a. She's a hearty laugher.
This soprano is a powerful singer.
This patient is a loud sneezer.
What a giggler this baby is!
This teacher is an incessant talker.
This tourist is a fast walker.
She's a competitive runner.

b. *These statues are real breakers.
*Stuffed chickens are slower freezers than unstuffed chickens.
*Because of its size, this snowman was a slow melter.
*That sweater was an amazing stretcher. It now fits me!
*These pieces of toast are fast burners.

Third, the two classes behave in opposite ways on the Adjectival Passive test, which requires an internal argument, consistent with unaccusatives but not unergatives.[33]

---

[30] In Carrier & Randall (1992) predication is licensed under mutual m-command.

[31] We discuss the mechanics of resultatives in Chapter 5. For now, we simply use it as one test to distinguish the two intransitive verb classes. Note that some of these resultatives will be reanalyzed below as what we will call "pseudoresultatives" but this has no bearing on the validity of the test.

[32] Some of these *-er* forms have a grammatical causative reading, where the *-er* corresponds to the external argument (*circuit-breaker*, which breaks circuits, a *freezer*, which freezes foods). These forms also show that the problem with the ungrammatical *-er* forms is not that their argument is inanimate; animate arguments do not improve their grammaticality: **Little kids are usually good stretchers*. **Many cattle were quick freezers in that storm*.

[33] The ability of unaccusatives to form adjectival participles was pointed out by Bresnan (1978). However, see Pesetsky (1995), who claims that this holds of only a subclass of unaccusatives.

(74) a. *a laughed kid
*a talked teacher
*a run jogger
*a sneezed patient
*a sung soprano
*a giggled baby
*a walked tourist

b. a broken statue
a stretched sweater
the burned toast
a frozen pond
a melted chocolate bar

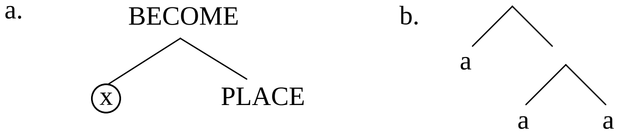
So, the two classes must link differently. The argument of *laugh* should be external and the argument of *break*, internal. Why are these linkings the predicted ones according to the ILH?

3.4.1 Unaccusative Verb Linking

The Isomorphic Linking Hypothesis encodes the intuitive idea that the geometry of the arguments at one level of representation is maintained at all levels of representation. That is, tree geometry is preserved in the mapping of elements from one level to another. However, we have seen verb CSs like *water* and causative *break* with non-linking terminals. In those cases, the CS-AS linking is a partial function of a complete isomorphic mapping. Single argument verbs present a similar situation. Here, too, isomorphism is maintained with only a subset of terminals linking. The question is why the linking for the two types of intransitives is different: unergative single argument verbs link externally and unaccusatives, internally.

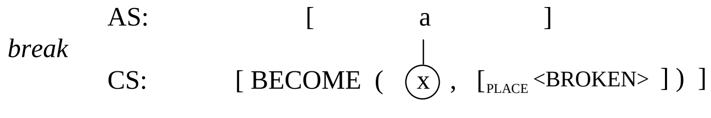
First, consider unaccusatives. The CS of unaccusative *break*, in (75a), contains a BECOME function with two arguments: x, which links, and an implicit, non-linking, PLACE. The AS template, in (75b), contains three arguments.

(75)



To achieve isomorphism between these representations, since x has a sister in the CS, it must link to an AS position with a sister, that is, internally:

(76)



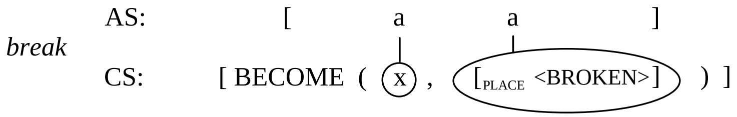
The same is true for these unaccusatives when they do link their PLACE, as in (77b).

(77) a. The statues broke.
The pond froze.
The chocolate melted.
That sweater stretched.
The toast burned.

b. The statues broke into pieces.
The pond froze solid.
The chocolate melted into a gooey mess.
The sweater stretched out of shape.
The toast burned black.

Here, a PP argument projects in the syntax and any content in the PLACE acts as a selectional restriction on the content of that PP. This version of *break* would be represented as in (78):

(78)



The selectional restrictions are what prevent cases like (79):

(79) *The statues broke into a whole.
*The pond froze into a liquid.
*The chocolate melted into a solid.

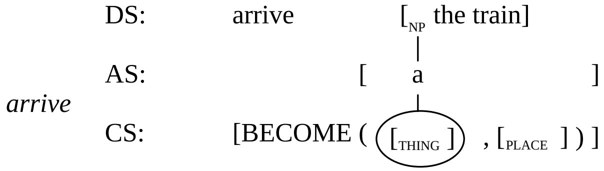
Another set of unaccusative verbs includes *arrive* (*depart, vanish, disappear*). These also have the option of occurring with or without a PP; their PLACE can link, as in (80a), or not link, (80b):

(80) a. The train arrived.
The train departed.
The money vanished.
The snowman disappeared.

b. The train arrived at the station.
The train departed from the platform.
The money vanished from the account.
The snowman disappeared from the playground.

In (80a), the PLACE, though non-linking, appears in the CS as an implicit argument but (unlike the *break* class), without any CS content, as shown in (81). (We represent *arrive* with the same basic CS as *go*; the differences are not relevant here.)

(81)



Since the theme and the PLACE are sisters, the theme links internally and the verb is unaccusative.

The tests in (82) confirm the unaccusative linking pattern of the verbs in (80). Like the *break* class, these verbs cannot take the *-er* affix, (82a), but can appear in adjectival passive participles (82b).

(82) a. *This train is a prompt arriver.
*The funeral guests said a prayer for the departer.
*Those ghosts are quick vanishers.
*That ambulance was a sudden appearer.
*Because of its size, this snowman was a slow disappearer.

b. the arrived trains
the departed person
the vanished ghosts
the disappeared snowman

3.4.2 *Unergative Verb Linking*

The Isomorphic Linking Hypothesis (ILH) makes the opposite prediction for unergative verbs, repeated in (83).

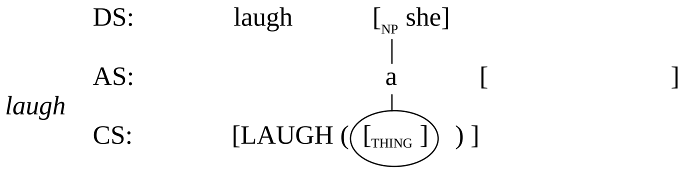
(83) She laughed.
She sang.
She sneezed.
She giggled.
She talked.
She walked.
She ran.

One way to represent verbs of this class is with a skeletal CS like the one for *laugh* in (84):

(84) *laugh* [LAUGH (x)]

With this representation (parallel to the one we suggested for *write* in (42)), *laugh*'s lone CS argument with no sisters (linking or otherwise) would link to the position in AS with no sister, the external argument position.

(85)



Unergative verbs would thus link differently from unaccusative verbs, following the different geometry of their CSs.

This representation for unergatives, though, is too simplistic. Though their frameworks differ, many investigators (Dowty, 1979; Hale & Keyser, 1993, 2002; Juarros, 2003; and others) assign more complex CSs to these verbs. These capture additional elements of their meaning, for example, that the participant of *laugh* is an Actor (it passes the Actor test: *What John did was* ***laugh***). This argues for including ACT in the skeletal CS:

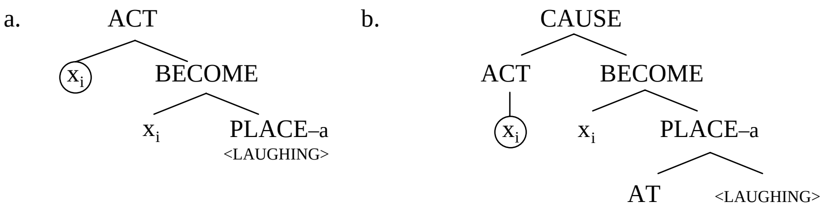
(86) *laugh* [ACT (x) . . .]

Adding a subscript would differentiate *laugh* from other unergatives that involve an Actor (following Rappaport Hovav & Levin (2005, 1998a,b)), as in (87):

(87) *laugh* [ACT $_{<\text{laugh}>}$ (x)]

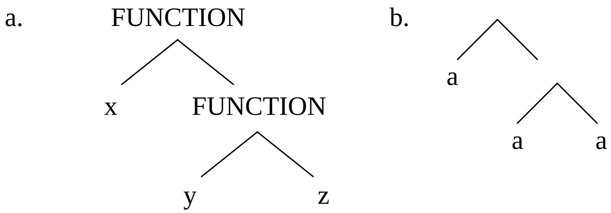
But additional structure is needed to capture the intuition that when one is laughing, one is in a laughing state (represented by abstract PLACE), as in (88a) or (88b):

(88)



While the exact representation of unergatives is not our focus, what is important is that in each one, the sole linking argument is higher than any other CS argument (linking or not) and it must therefore link externally. The relevant geometry is circled in (89):

(89)



Because the various structures for unergatives all give the same result, we will continue to use the simple “abbreviated” version in (84), bearing in mind that this is a shorthand for a more articulated structure.

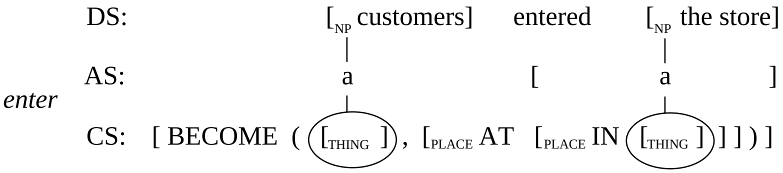
3.4.3 Some Linking Predictions

The difference in the geometry of unaccusative and unergative verbs extends to other classes. Let us go back to the *enter* class, discussed in Section 3.3, above, and repeated in (90):

(90) enter, occupy, exit, leave, cross, descend, inhabit

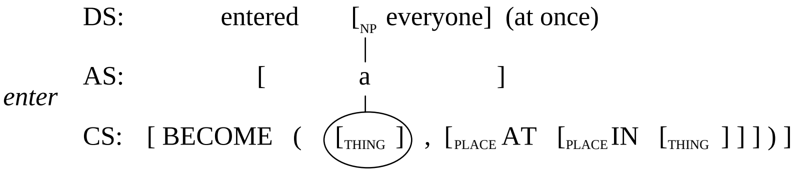
As we saw, the two linking arguments (the THING theme and the THING inside PLACE) are at different levels, so they link as external and internal arguments, respectively. The non-linking PLACEs do not affect this linking, because they are nested with one of the linking constituents and are ineligible to link. (Recall (13c) et seq., above.)

(91)


DS: [NP customers] entered [NP the store]
AS: a [a]
enter
CS: [BECOME ([THING]), [PLACE AT [PLACE IN ([THING])]])]

But some members of this class (*enter, descend*) can occur with only one linking constituent and an implicit PLACE (*Everyone entered at once, the airplane descended quickly*).

(92)


DS: entered [NP everyone] (at once)
AS: [a]
enter
CS: [BECOME ([THING]) , [PLACE AT [PLACE IN [THING]]]])]

Since there is no content to the implicit PLACE, the CS constituents embedded inside it are invisible. And since PLACE is at the same CS level as the linking theme THING, the THING should link internally. As (93) shows, this prediction holds. These intransitive forms are unaccusative, failing the *-er* test and passing the participle test:

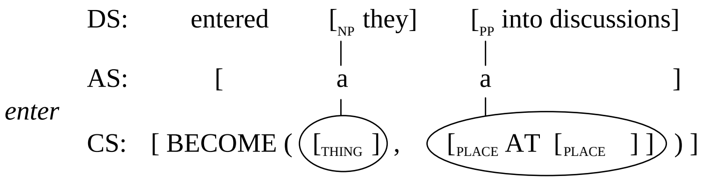
(93) a. *This contestant is a frequent enterer.
*That testicle was the descender.

b. the recently-entered contestants
the (un)descended testicle

That is, they behave just like unaccusative *arrive*-class verbs.

There is one more version of *enter* to account for, two-argument *enter* whose second argument is a PP (rather than an NP): *they entered into discussions*. There are two linking arguments, the theme and the outer PLACE, as shown in (94):

(94)


DS: entered [NP they] [PP into discussions]
AS: [a a]
enter
CS: [BECOME ([THING] , [PLACE AT [PLACE]])]

Since the two linking CS constituents are equally embedded, this *enter*, like single-argument *enter*, should be unaccusative. And it is. Unlike the other two-argument *enter* (*enter contests*), which allows *-er* affixation (recall *an enterer of contests* from (65a)), this two-argument *enter* does not, as (95) shows, since it has no external argument.

(95) *There were two enterers in(to) the discussions

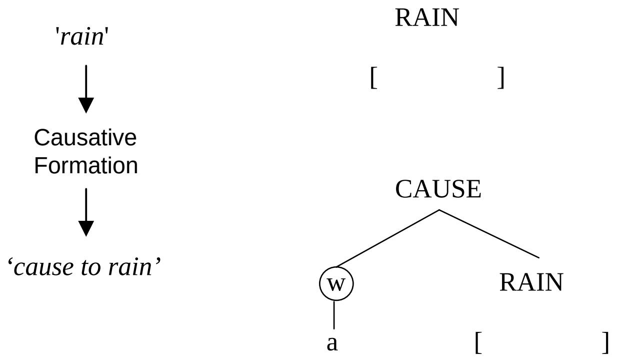
So the two two-argument versions of *enter* correspond to two different pairs of linking constituents, which obey the ILH in different ways. In the next chapter, we will consider a number of verb classes that have more than one way of linking and show that all of their alternations also obey the ILH.

Another correct prediction made by the ILH concerns how productive Causative Formation in Tagalog operates for a set of verbs that we have not yet considered, the zero-argument verb *rain*, shown in (96a) and (97) in Tagalog. After Causative Formation applies, in (96b), the argument of "cause to rain", w, as a unique CS argument in a CS containing no other terminals, should link to a unique AS position, that is, externally. And it does, as (97) shows. (Recall from (30), above, that the verbal infix, *um*, and prefix, *nag*, indicate that the topic, marked with *ang*, is the external argument.)

(96) a. ?-um-ulan.
um-rain
'It rained.'

b. nag- pa- ulan ang salamangkero
nag- cause- rain ang magician.
'The magician caused it to rain.'

(97) Tagalog causative formation for a 0-argument verb (“*rain*”)



To summarize, the ILH makes valid predictions for both classes of single-argument verbs, both unaccusatives and unergatives. It determines how arguments link based on the complete CS geometry, both linking as well as non-linking constituents.

3.5 Some Problematic Verb Classes

There are a number of verb classes that present a challenge to our linking theory (and to the two other linking proposals that we have been discussing) because they involve apparent linking reversals. For example, it is often assumed that *like* and *please* assign identical thematic roles: experiencer and theme. Yet the experiencer is the subject for *like* but the object for *please*.

(98) a. I like/love/adore that garden.
I dislike/hate/abhor that movie.

b. That garden pleases/attracts/captivates me.
That movie bothers/annoys/upsets me.

To handle these cases, we could take one of three approaches. The first is to abandon hope of formulating linking rules for these verbs. The claim would be that while linking is predictable for a large portion of the lexicon, the linkings for certain subclasses have to be memorized on a verb-by-verb basis. This is obviously an undesirable solution since the problematic cases fall into semantic classes cross-linguistically: “psych” verbs like those in (98b) and verbs of possession (e.g. *have* in *I have a pet iguana*) are two. If the exceptional-linking verbs had to be memorized one by one, why wouldn’t the assortment of these verbs be random? A second kind of solution (Postal, 1971; Belletti & Rizzi, 1988; and others), takes the position that *like* and *please* link identically, but movement in the syntax obscures their identical D-Structures (or for Belletti & Rizzi, nearly identical D-Structures). The third approach – the one we subscribe to – is to say that the verbs with “reversed” linking patterns do **not** assign identical thematic roles. Rather, we do not have the proper semantic representations for these verbs. Once we do, they will not be counterexamples to our theory. This third approach is the one taken by Grimshaw (1990), Jackendoff (1990), and Pesetsky (1995), among others. (For a variety of other views, see also Croft (1993); Bouchard (1995); Wechsler (1995); Levin (1999); Pylkkanen (2000), and Reinhart (2002). For an excellent summary, see Levin & Rappaport Hovav (2005), chapter 1.2.) While at this point the ILH appears to be no better than THH and UTAH in handling these verb classes, for all of the reasons we have seen above, we believe that it will be more likely to do so once we provide the proper CSs for these verbs.

3.6 Summary: The Linking Theory So Far

Our linking theory is based on the hypothesis that the geometry at the semantic level of representation, CS, is isomorphic with the geometry in the syntax. This hypothesis, the Isomorphic Linking Hypothesis (ILH), holds for all of the terminals in the two representations.

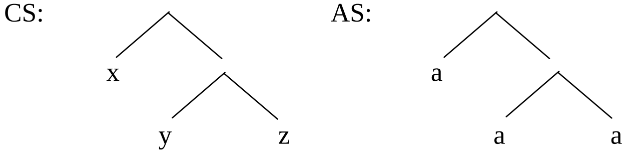
(99) **Isomorphic Linking Hypothesis** (preliminary version, repeated from (6))
The linking nodes at CS map isomorphically into the terminal nodes at AS.

Our 3-argument AS template has two levels, one external (higher) and two internal (lower). In Chapter 2 we did away with the direct/indirect internal argument distinction, so there is no difference between the two internal positions:

(100) a [a a]

So, according to the ILH, in the CS in (101), x maps to the higher a and y and z link to the lower a’s.

(101)

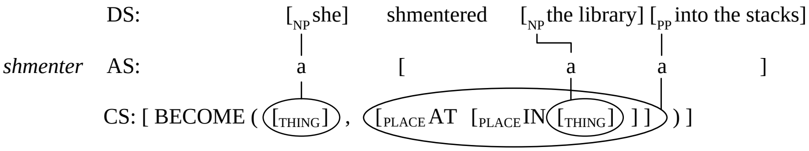


Other principles (case and category type), which are independently needed, determine which syntactic XPs these internal arguments map to. Since not every terminal in every CS links, linking is generally a partial function of the complete potential mapping.

We can think of the ILH as an algorithm for associating CS constituents to the syntax by assigning them to internal or external slots in AS, depending on where they appear in the CS. The only caveat is that CS structure be preserved. When there is more than one linking element, the relative depth of embedding of the linking elements must match from one representation to the other. As such, the ILH is an interface condition, since it regulates permissible mappings between an articulated CS geometry and an impoverished syntax.

Our linking theory embodies one other claim: two nested constituents cannot both link. So a verb like *shmenter* (repeated from (16), above) cannot exist:

(102)



This is because if two constituents are nested in CS, then they must link to nested a’s, an impossible configuration.

Although the ILH legislates **how** CS constituents are realized (externally or internally), exactly **which** CS constituents link is stipulated. Two different verbs can have identical CSs but stipulate different linking patterns, as we saw for *go* and *enter*. And a single verb can have two different linking possibilities. *Break* and *arrive* optionally link their PLACE; both versions are unaccusative. *Enter* has three versions, in which different CS constituents are designated as linking: it can link the theme only, or the theme along with either the THING inside the PLACE, leading to transitive syntax, or the outer PLACE, leading to unaccusative syntax. Since the only way to predict a verb’s linking pattern is to specify which of its CS constituents link, it should be clear that the circles that we are using to designate a constituent as linking are an important part of a verb’s lexical entry. But this is not a strike against the ILH. Every theory of linking has to indicate whether a CS constituent is syntactically realized. Whether by subscripting, appearing on a list, or circling, the linking CS elements must be designated.

Chapter 4
Syntactically Unexpressed Arguments, Incorporation, and Adjuncts

In the last chapter, we introduced a new theory of linking based on the Isomorphic Linking Hypothesis, repeated from Chapter 3 (6) in (1), which maps designated arguments to the syntax based on the geometry of Conceptual Structure (CS) representations.

(1) **Isomorphic Linking Hypothesis** (preliminary version)
The linking nodes at CS map isomorphically into the terminal nodes at AS.

We saw how two- and one-argument verbs link under the ILH, including some with a CS argument that does not link to the syntax. Verbs with non-linking or optionally linking arguments display what have been called argument "mismatches" and in this chapter, we will look at a variety of them to see how they square with the ILH. As we explore these verbs, we will propose that they provide evidence for a "multiple-entry" rather than a "single-entry" approach to the lexicon.

4.1 Implicit Argument Verbs and Implications for Lexical Entries

4.1.1 Implicit Theme Verbs: *cook, eat, drink*

Verbs such as *cook*, *eat*, and *drink* can occur either with a postverbal NP theme as in (2a), or without one as in (2b). Notice that when the theme is missing, it is implicit in the verb's meaning. *Jack cooked* implies that Jack cooked something.

(2) a. Transitive verbs
Jack cooked the eggplant.
They already ate lunch.
John drank something from this cup.
Liza likes to read owner's manuals.
The gardener waters the tulips on Tuesdays and Thursdays.
He painted the bookcase.

J. Randall, *Linking: The Geometry of Argument Structure*, 89–135
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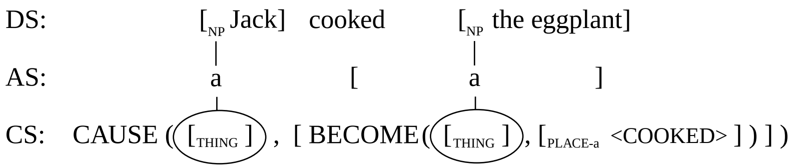
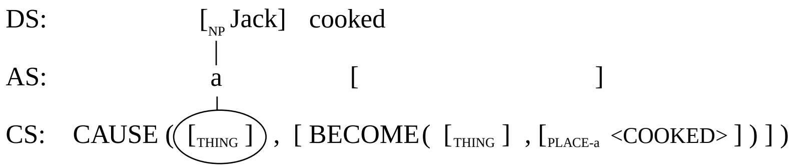
b. Implicit theme verbs
Jack cooked.
They already ate.
John drank from this cup.
Liza likes to read.
The gardener waters on Tuesdays and Thursdays.
He painted all day.

This implicit theme is present in the CS of the verb. But the argument is not present in the verb’s AS, since it is not realized syntactically. While the lexical entry for transitive *cook* is (3), with two syntactically expressed arguments, one external and one internal (consistent with the ILH), we are claiming that the lexical entry for intransitive *cook*, with only one syntactically expressed argument, is (4).

(3) transitive *cook*


DS:
[NP Jack] cooked [NP the eggplant]
AS:
a [a]
CS:
CAUSE ([THING] , [BECOME([THING], [PLACE-a <COOKED>])])

(4) implicit theme *cook*


DS:
[NP Jack] cooked
AS:
a [ ]
CS:
CAUSE ([THING] , [BECOME([THING] , [PLACE-a <COOKED>])])

In (4), the agent is higher than the non-linking theme and PLACE, so it links externally. That is, implicit theme verbs, as predicted by the ILH, are syntactically unergative. This is confirmed by how these verbs form resultatives (Carrier & Randall, 1992; Levin & Rappaport, 1995). Unlike the unaccusative verbs in (5a), which, as we saw in the last chapter, do not require a postverbal NP because a trace licenses predication, verbs like *cook* do, as (5b) shows. If the implicit CS argument were syntactically represented, the (5b) sentences would be grammatical without overt NPs.[1]

---

[1] Though we analyzed the cases in (5a) as resultatives in Carrier & Randall (1992), we will argue later in this chapter that they are actually what we will call “pseudo-resultatives”. However, the point remains. An XP predicate (regardless of whether it is a “result” XP) requires a local subject. For all of the verbs in (5a), the local subjects have moved, leaving a trace.

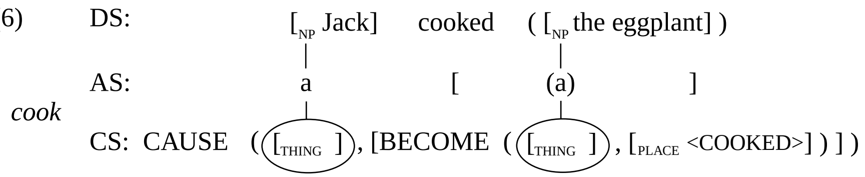
(5) a. The statues broke (*themselves) into pieces.
The pond froze (*itself) solid.
The chocolate melted (*itself) into a gooey mess.
The sweater stretched (*itself) out of shape.
The toast burned (*itself) black.

b. The chef always cooks *(himself) into a frenzy.
That chef always cooks *(the eggplant) soggy.
That teacher sometimes reads *(the class) into a stupor.
That teacher sometimes reads *(himself) bleary-eyed.
They ate *(themselves) sick.
The gardener waters *(the tulips) flat.
The gardener waters *(his arms) sore.

So although there is no internal argument in AS, the unlinked CS theme argument gives these verbs their implicit theme interpretations.

We have proposed that the two versions of *cook* be represented in two lexical entries but we might consider whether the two-entry approach is the best way to represent these verbs since it requires a lexical rule to relate the two forms and it also leaves open the possibility that the two entries could differ in other ways. The alternative is a single entry with parentheses, as proposed by Jackendoff (1990), in (6).[2]

(6)


DS: [NP Jack] cooked ([NP the eggplant])
AS: a [(a)]
cook
CS: CAUSE ([THING]), [BECOME ([THING]), [PLACE <COOKED>])])

Jackendoff prefers this approach on the grounds that implicit themes are not freely interpretable but obey whatever selectional restrictions apply to the overt theme argument. For example, *cook*'s theme must be a foodstuff. (7) can only be said jocularly. And the implicit theme sentence in (8) is unacceptable unless the chemist cooked food.[3]

(7) ?The chemist cooked $\left\{\begin{array}{l}\text{his contact lenses}\\ \text{the hydrogen mixture}\end{array}\right\}$ at a high temperature.

(8) ?The chemist cooks at a high temperature.

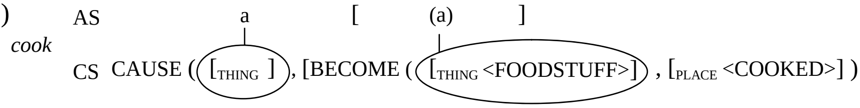
---

[2] We have translated his subcategorization frames into our AS representations.

[3] We are ignoring the unaccusative reading here where someone, a cannibal for instance, is cooking the chemist.

Jackendoff explains this correlation by adding the annotation <FOODSTUFF> to the theme argument:

(9)


AS
a
[
(a)
]
cook
CS CAUSE ([THING]), [BECOME ([THING <FOODSTUFF>] , [PLACE <COOKED>])

When an NP object is present, its CS fuses with the theme. But its semantic features must be compatible with the annotation <FOODSTUFF>. When the NP is absent, the unlinked theme in CS bears the specification <FOODSTUFF>. Under this approach, selectional restrictions are formally the same as semantic features on implicit arguments.

However, selectional restrictions actually provide an argument *for* the two-entry approach. Consider *eat*. The selectional restrictions on its implicit theme are tighter than those on its overt one. Although one can eat documents as in (10a), (10b) can only mean that the agent ate a meal or a snack, not a document.

(10) a. To get rid of classified information, if necessary a secret agent will eat documents.
b. Has the secret agent eaten yet?

To impose tighter selectional restrictions on the implicit theme of unergative *eat requires* a separate lexical entry. The single-entry approach would not work.

Drink provides a similar example. The theme of transitive *drink* must be a liquid, the same holds for intransitive *drink*, as shown in (11). But in (12), the understood theme is not just a liquid but "alcoholic beverages", and the drinking is understood as excessive.

(11) a. John drank the potion/*powder.
b. John drank from this cup.

(12) John's problem was that he drank.

This requires minimally two entries, the theme in one, <LIQUID>, in the other, <ALCOHOLIC BEVERAGE>.

Two (or more) entries are also needed for derived words. The meanings of *flatterer* and *flattery* in (13) are built on the CS that they inherit from *flatter*, and reflect that word's CS selectional restrictions, but we would not want to say that the three belong to a single lexical entry:

(13) a. She flattered the politician/*the dog/*the speech
b. She's a flatterer of politicians/*dogs/*speeches
c. The flattery of politicians/*dogs/*speeches

So the two-entry approach does seem to be needed for all of these cases. But the challenge remains to get it to do as well as the one-entry approach in explaining why, if the entries are indeed unrelated, the themes in both versions carry identical selectional restrictions. And what about the proliferation of lexical items? Isn't that a problem?

Neither of these is a problem assuming that the various entries for each item are related by lexical rule. Lexical rules perform two related functions. They allow for new derivations so that a new verb of one class is predicted to have a corresponding verb of the related class. (One can *fax a letter* or simply *fax (all day)*.) But they also act as traditional "redundancy rules" (Jackendoff, 1975; Aronoff, 1976), which make it cost-free to fully specify every entry, since all of the shared systematic information in each entry, which is expressed by the rule, comes at "no cost".

For *cook, eat* and *drink*, in the unmarked case the two forms in each transitive-intransitive pair will be identical – with identical CS annotations – except that in one the theme is not specified to link. Where the verbs differ further, the two entries will reflect the differences independently, the redundancy rule relating the rest.

We will continue to represent transitive and implicit theme verb pairs as distinct entries, related by rule. We raise this issue here only to ensure that it does not confuse our central point: an implicit argument is best treated as a CS argument that does not link to AS. Implicit theme verbs provide another case of a many-to-one mapping between CS and the syntax. And the way that they link is predicted by the ILH.

4.1.2 More Implicit Theme Verbs: *rain* and *snow*

Another class of verbs with implicit themes are weather verbs (*rain, snow*). However, unlike the *cook* verbs, which have two CS arguments, one of which can be unexpressed in the syntax, these verbs appear to have just one CS argument, which can be expressed or not.[4]

(14) It rained (fine droplets).
It snowed (huge flakes).

What kind of CS would give rise to these examples? If the theme of *rain* is <WATER DROPS> and the theme of *snow*, < SNOWFLAKES>, one possible CS representation is (15). This would make them essentially verbs of motion, with an implicit PLACE that – unlike the theme – never links:[5]

---

[4] Verbs of body fluid emission such as *pee, drool, throw up* and *vomit* are similar to these verbs in also having implicit themes which can optionally link, as in (i). For some reason, the PLACE PP sounds better when the theme is unexpressed.

(i) The baby threw up/vomited (her lunch).
(ii) The passenger vomited (?his lunch) into the bag.

See Juarros (2003) for an analysis of what she calls "*spit*"-class verbs, to which these belong, in a Hale & Keyser framework.

(15) a. DS: snowed
AS: [ ]
CS: BECOME ([$_{\text{THING}}$ <SNOWFLAKES>], [$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ ...]])

b. DS: snowed [$_{\text{NP}}$ huge flakes]
|
AS: [a]
|
CS: BECOME ([$_{\text{THING}}$ <SNOWFLAKES>] , [$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ ...]])

Notice that, for some speakers at least, the PLACE, though it does not link as an argument, can be expressed in an adjunct PP, following other adjuncts, as shown in (16) and (17).

(16) It rained torrentially (right into the open windows).
It snowed yesterday (on(to) my seedlings).

(17) In the amateur production of *La Boheme* last week, it snowed heavily into the orchestra pit but only lightly onto the stage.

Given the ILH, because the theme has a CS sister, when the theme links, as in (15b), it links internally, regardless of whether the PLACE links. What matters for linking is the geometry of CS. The internal argument surfaces as the object, making these verbs unaccusative, with ambient *it* inserted in subject position.[6] Now, since the ILH and the Theta Criterion regulate the appearance of arguments but not adjuncts, we need to show how the adjunct PPs in (16) are represented. We will turn to this question when we introduce Adjunct Fusion in Section 2, below.

---

[5] Interestingly, specifying the theme of *rain* as something like <WATER DROPS> and the theme of *snow* as <SNOWFLAKES> may be too restrictive, since sentences like (i) are grammatical. We leave this as an open question.

(i) It rained manna for forty years.
It rained wine/money.
It snowed popcorn/confetti.

[6] There is debate about the unaccusativity of these verbs. Many have claimed that crosslinguistically, cognate objects are impossible with unaccusatives (Marantz, 1984; Pesetsky, 1995; MacFarland, 1995). However, others, citing counterexamples like *die*, question whether cognate "objects" are true objects (Ruwet, 1991; Pereltsvaig, 1999, 2002; Abraham, 1999), and question whether standard unaccusativity tests are reliable (see Reinhart & Siloni, 2004 among others).

4.1.3 Implicit PLACE Verbs: *deliver* (Concrete PLACE) and *transform* (Abstract PLACE)

Parallel to verb classes with themes that can either link to AS or not are verbs whose PLACE can link or not. There are two types: concrete PLACE verbs and abstract PLACE verbs.

4.1.3.1 Implicit Concrete PLACEs: The *deliver* Class

The *deliver* class, which includes *transmit, convey, deposit,* and *transfer*, can occur either with or without a PP, as (18) shows.

(18) a. This company delivers newspapers (to rural customers).
b. The machine transmitted the fax (to everyone on the list).
c. The NGO conveyed the message (to the distant villages).
d. Dan deposited the money (in(to) a savings account).
e. Ann transferred (to a different college).

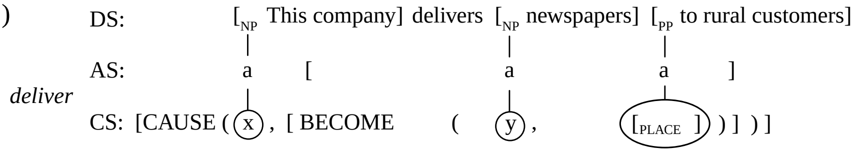
The *do so* test confirms that when these PLACEs occur, they are not adjuncts but link to AS as arguments. *Do so* replaces the verb and all of its arguments, leaving only adjuncts behind. The *to*-PPs must be included in what is replaced by *do so*, as the contrast between (19) and (20) shows.

(19) a. *This company delivers newspapers [to rural customers] but another company does so [to customers inside the beltway].
b. *This machine transmits faxes [to local fax machines] and that machine does so [to long-distance ones].
c. *The NGO conveys messages [to remote areas] but the government does so only [to local villages].
d. *Dan deposits money [in(to) a savings account] but Ned does so [in(to) a money market fund].
e. *Ann transferred [to a different college] and Tess did so [to a different major].

(20) a. This company delivers newspapers to rural customers [on weekends] but another company does so [during the week].
b. This machine transmits faxes to local fax machines [every day] and that machine does so [once a week].
c. The NGO conveys messages to remote areas [reliably] but the government does so [unreliably].
d. Dan deposits money in(to) a savings account [weekly] and Ned does so [monthly].
e. Ann transferred to a different college [this year] and Tess did so [last year].

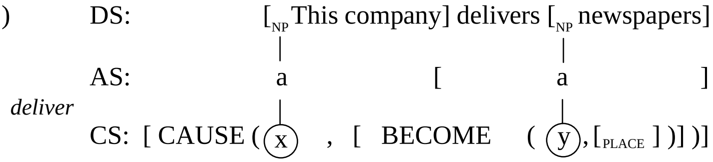
The entry in which the PLACE is expressed, in (21), has one external and two internal AS arguments, in accordance with the ILH.[7]

(21)


DS:
[NP This company] delivers [NP newspapers] [PP to rural customers]
AS:
a [a a]
deliver
CS: [CAUSE (x , [BECOME (y , [PLACE])])]

Now notice that even when the PP is absent a PLACE is understood. In (18a) without the parenthetical PP, this company delivers newspapers somewhere, or to someone. For this reading, we propose the entry in (22). This linking also accords with the ILH, since the relative levels of the CS arguments are mirrored in AS.

(22)


DS:
[NP This company] delivers [NP newspapers]
AS:
a [a]
deliver
CS: [CAUSE (x , [BECOME (y , [PLACE])])]

(22) is just like the entry for *put* (discussed in Chapter 3, Section 2.1) except that its PLACE is unlinked. But the PLACE is present in the CS, so an unspecified PLACE is understood or implicit. And just as for the implicit theme verbs like *cook*, above, we will represent these verbs with two separate entries.

4.1.3.2 Implicit Abstract PLACEs: The *Transform* Class

In addition to verbs whose implicit PLACE argument is concrete (a location), there are verbs whose implicit PLACE is abstract, a state. Two such verbs are *transform* and *change*.

Transform can occur with or without a PP expressing a state

(23) a. Liz transformed the milk jug.
b. Liz transformed the milk jug (into a musical instrument).

Like the location PPs in (19)–(20) above, these PPs are arguments, not adjuncts:

(24) a. *Liz transforms milk jugs [into musical instruments] and Bob does so [into boat balers].
b. *One magician changes scarves [into bunnies] and the other does so [into doves].

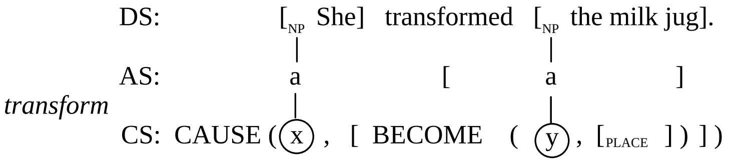
(25) a. Liz transforms milk jugs [into musical instruments] [by herself] and Bob does so [with help].
b. One magician changes scarves [into bunnies] [with a wand] and the other does so [without a wand].

---

[7] The entry in (21) and all the other 3-argument entries in this chapter will be revised in Chapter 7. But this revision does not affect the point here.

Here, too, when the optional PP is absent, a new state is still understood. Thus our representation of the lexicon – syntax mapping for (23a) is (26). There is an implicit (non-linked) abstract PLACE in the verb's CS. And following the ILH, whether the PLACE links or not, x and y link to external and internal AS positions, respectively.

(26)


DS:
[NP She] transformed [NP the milk jug].
AS:
a [a]
transform
CS: CAUSE (x , [BECOME (y , [PLACE])])

Transform and *change* are thus the change-of-state counterparts of *deliver*.

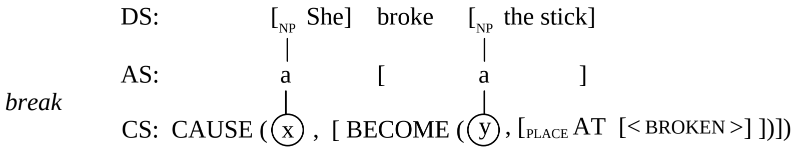
4.1.3.3 More Implicit Abstract PLACEs, or "Pseudoresultatives": *break*

The verbs in (27) are parallel to *transform* and *change* in having an implicit abstract PLACE (a state), but the PLACE, crudely represented beside each verb, is much more strictly selected.[8]

(27)	She *broke* the stick.	<BROKEN>
	She *flattened* the tulips.	<FLAT>
	She *melted* the rubber.	<IN LIQUID STATE>
	She *opened* the box.	<OPEN>
	She *froze* the quiche	<FROZEN>

The CS for *break*, with its non-linking abstract PLACE, is shown in (28).

(28)


DS:
[NP She] broke [NP the stick]
AS:
a [a]
break
CS: CAUSE (x , [BECOME (y , [PLACE AT [< BROKEN >]])])

Also like *transform*, the PLACE can be syntactically expressed, provided it conforms to these semantic features, as shown by the contrast between (29) and (30).

(29) a. She broke the stick *into six more or less equal pieces*.
b. The gardener's helper flattened the tulips *as flat as pancakes*.
c. The chef melted the butter *to a fine liquid*.
d. She opened the door *wide open*.
e. She froze the quiche *rock solid*.

---

[8] These verbs are the transitive counterparts to the intransitive *break* class that we discussed in Chapter 3 Section 4.1.

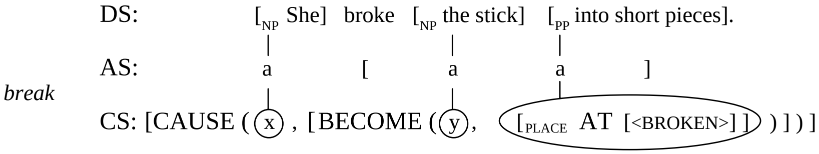
(30) a. *She broke the stick *into a whole*.
b. *The gardener’s helper flattened the tulips *into peaks*.
c. *She melted the butter *into a solid*.
d. *She opened the door *shut*.
e. *She froze the quiche *mushy*.

Notice that the choice of PLACE is further constrained by a general Gricean-style constraint that prohibits redundancy, which prevents cases like (31).[9]

(31) a. *She broke the stick *into smaller units*.
b. *The gardener’s helper flattened the tulips *flat*.
c. *She melted the butter *to a liquid*.
d. *She opened the door *open*.
e. *She froze the quiche *frozen*.

So, like *transform* and *change, break* takes an an optional argument, and will be represented in a parallel fashion, with two lexical entries, related by rule. The entry in which the PLACE does not link is in (28); the entry in which it does is in (32).

(32)


DS: [NP She] broke [NP the stick] [PP into short pieces].
AS: a [a a]
break
CS: [CAUSE (x), [BECOME (y), [PLACE AT [<BROKEN>]])])]

Evidence for the argument status of the optional XP is its behavior on the *do so* test. It cannot be left behind as adjuncts can, so it must be an argument.

(33) a. *John broke sticks *into short pieces* and Mary did so *into longer ones*.
b. *The baker’s helper flattened the dough *paper-thin* and the baker did so *a bit thicker*.
c. *The chef melts butter *to a fine liquid* while the sous-chef does so *to a lumpy texture*.
d. *Mary opens windows *wide open* but John does so *halfway open*.
e. *This freezer freezes food *quite solid* but that one does so *hard as a rock*.

The same result obtains for the V-projection fronting test in (34), which requires all arguments to be fronted while adjuncts, like *on Saturday,* can be left behind. The ungrammaticality of (34b,d) again confirm that the PP *into short pieces* is an argument.

---

[9] This could be handled by whatever general discourse principle handles the strangeness of (i).

(i) ?My brother is a male. (cf. My brother is an uncle.)

Male adds no further meaning to the sentence beyond the meaning of *my brother*, yet *my brother* and *male* do not fuse with the same constituent in CS. Fusion is not even implicated here. One proposed constraint to handle these cases is Randall’s (1982a) “Redundancy Restriction”. We will see additional contexts where it is needed in the next section.

(34) John offered to break the sticks into short pieces (on Saturday) . . .
  a. and break the sticks into short pieces he did.
  b. *and break the sticks he did into short pieces.
  c. and break the sticks into short pieces he did on Saturday.
  d. *and break the sticks he did into short pieces on Saturday.

It should come as no surprise that the PLACE PP is an argument of these verbs. These are the transitive counterparts of the intransitive unaccusative *break* class, whose PLACEs either can be implicit or can link as arguments (*the statues broke (into pieces)*). And like intransitive *break*, the two versions of transitive *break* – with either an implicit or a linking PLACE – are both consistent with the ILH. The agent and theme link as external and internal arguments respectively and the PLACE, when it links, because it is a sister of the theme, links internally.

Before proceeding, we should note that in our earlier analyses (Carrier & Randall, 1992, 1993), we (along with many other investigators) considered the cases in (29) resultatives. However, we now believe that they are not, and from here on we will call them "pseudo-resultatives".

Though for both we are claiming that the XP is an argument of the verb, there are two major semantic differences between these verbs, which we revisit in Chapter 7, Section 2 and true resultatives, which are the topic of Chapters 5 and 6. First, in a resultative, the XP adds an abstract PLACE (i.e., a state) to the basic meaning of a verb that does not already imply one. *Whack*, in (35a), for instance, gets its change-of-state dimension from the result PP *into six more or less equal pieces*. Without it, *she whacked the stick* does not entail that the stick came to be in smaller units (or any other new state, for that matter). In contrast, for the pseudoresultative *she broke the stick into pieces*, the portion without the PP, *she broke the stick*, does entail an endstate, and the XP *into pieces* simply specifies it further. The same contrast holds between the other true resultatives in (35b–e) and the pseudoresultatives in (29), regardless of whether they are transitive (*whack, water, whisk* and *wiggle*) or intransitive (*run*).

(35) **True resultatives**
  a. She *whacked* the stick into six more or less equal pieces.
  b. The gardener's helper *watered* the tulips as flat as pancakes.
  c. The chef *whisked* the butter to a fine liquid.
  d. The joggers *ran* their feet black and blue.
  e. She *wiggled* the door open.

Second, resultatives entail that the base verb's activity – the *whacking* or *watering* or *running* – is performed **to such an extent** as to bring about the resultant change of state. This component of meaning is absent from (29a–e). While we will leave this "extent" notion somewhat informal for the time being, we propose that there are three ways it can be achieved. *Whack*, in (35a) shows two of them. There can be one whack, but with **sufficient force**, to get the stick to its resultant state. Or, it can happen **iteratively**, in a series of whacks, until the result is achieved. For verbs like *run*, in (35d), there is a third possibility: the running can be for a **sufficient**

duration to achieve the result. (*Run* probably has the first two possibilities as well, but the duration reading is most natural.)

In contrast, the "extent" interpretation is not part of the meaning of the pseudoresultatives in (29). Because the meaning of the verbs by themselves entails the result, and the PP only fine-tunes the specifics, there is no need for the activity of the verb to reach a sufficient extent for the result to come about.

4.2 Incorporated Argument Verbs

The previous section focused on "implicit argument" verbs, which can optionally omit an argument (*Jack cooked, This company delivers newspapers*.) We claimed that when the argument is absent, it is still present in the verb's CS. *Jack cooked* implies that Jack cooked **something**, though it is not clear from the verb exactly what that something is. Likewise, we know that this company delivers newspapers somewhere but we don't know where.

There is another class of verbs with an implicit CS argument but this argument cannot link to a syntactic argument. Instead, if it is expressed at all, it must be as an adjunct. We will call this type of implicit argument verb "incorporated argument" verbs to distinguish them from the former type. We will look at (a) verbs with an incorporated theme and (b) verbs with an incorporated PLACE.[10] For both, the non-linking of the incorporated argument, as well as the linking patterns of the arguments that do link, are correctly predicted by the Isomorphic Linking Hypothesis in (1), above.

4.2.1 Incorporated Theme Verbs and Adjunct Fusion: *butter* and *bone*

Consider the incorporated theme verbs typified by *butter* in (36).

(36) a. The queen buttered her crumpet.
b. The queen powdered her nose.
c. The queen salted her tomato.
d. The baker dusted the crullers (with confectioner's sugar).
e. Fred lacquered the box.
f. They plastered the ceiling.
g. The runner bandaged her knee.
h. They tiled their bathroom floor.

---

[10] With this name we are deliberately evoking Hale & Keyser's (1993, 2002) analyses of these verbs, which extends Baker's (1988) claim that the understood argument is syntactically represented and incorporated into an abstract causative verb. Under our analysis, the understood arguments are also "incorporated", that is, present in the verb's CS, but they are not represented in the syntax.

Each of these verbs allow its theme to be expressed in an adjunct: *the queen buttered her crumpet (with margarine)*. We begin with one analysis of these verbs, essentially the one proposed by Jackendoff (1990), and with it we introduce his notion of **Adjunct Fusion**, which we will adopt. We then propose a different analysis, with alternative CSs for these two classes and we consider how the fusion of adjuncts is constrained by a **Prohibition Against Double Fusion**, introduced for arguments in Chapter 1 (47). The linking of these alternative CSs, we will see, is also consistent with the ILH.

4.2.1.1 An Analysis of *butter* Based on *put*

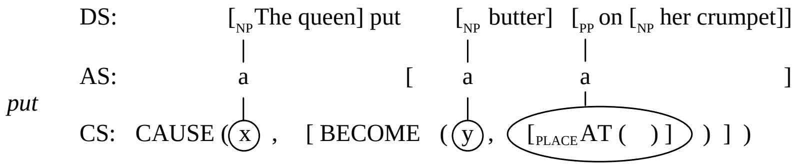
One way to analyze the verbs in (36) is to say that their meanings are parallel the meaning of *put*. Thus, (36a) means 'The queen put a buttery substance on her crumpet' (Jackendoff, 1990; see also Clark & Clark, 1979 and others in a variety of frameworks).[11]

But these verbs differ from *put* in three ways. First, unlike *put* (and unlike the implicit theme verbs like *cook*, in Section 1, above), their themes (<A BUTTERY SUBSTANCE> for *butter*) **cannot** link to an AS position:

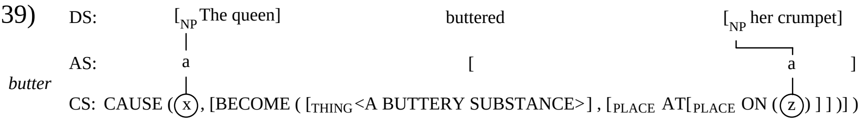
(37) a. *The queen buttered *margarine* onto her crumpet.
b. *The queen powdered *talcum* onto her nose.
c. *The queen salted *a salt substitute* onto her tomato.

Second, their implicit theme is selected. *Put* selects any THING for its explicit theme, but *butter* requires its THING to be <A BUTTERY SUBSTANCE>, *tile* requires <TILE>, and so forth. These differences are shown in (38) and (39).

(38)



(39)


DS:
[NP The queen]
buttered
[NP her crumpet]
AS:
a
[
a
]
butter
CS:
CAUSE (x, [BECOME ([THING <A BUTTERY SUBSTANCE>] , [PLACE AT[PLACE ON (z))]])])

The implicit theme [THING <A BUTTERY SUBSTANCE>] is like the implicit theme [THING <FOODSTUFF>] of intransitive *cook* discussed above. But unlike *cook*'s theme, this theme cannot be expressed as an argument. However, as Jackendoff points out, it can be expressed in an adjunct *with*-PP:

---

[11] We have included in (36) some count themes (g,h) in addition to the mass themes. For these the meaning would not be 'substance' but 'thing(s)', for example, 'we put a bandage-like thing' or 'we put some tile-like things'.

(40) a. The queen buttered her crumpet *with margarine*.
b. The queen powdered her nose *with cornstarch*.
c. The queen salted her tomato *with a salt substitute*.
d. The baker dusted the crullers *with confectioner's sugar*.
e. The cabinetmaker lacquered the box *with a water-based product*.
f. They plastered the ceiling *with a lime-based substance*.
g. The runner bandaged her knee *with a gauze bandage*.
h. They tiled their bathroom floor *with terra cotta slabs*.

Jackendoff (1990) claims that even though these PPs are adjuncts, not arguments, their CSs **must** be fusing with the CS of the unlinked theme, because the selectional restrictions on the implicit themes also apply to them. As (41) shows, the *with*-PP must designate a buttery substance for *butter*; a powdery substance for *powder*; and so on.

(41) a. *The queen buttered her crumpet *with olive oil*.
b. *The queen powdered her nose *with cold cream*.
c. *The queen salted her tomato *with a sugar substitute*.
d. *The baker dusted the crullers *with raisins*.

Before accepting the idea that the CSs of syntactic adjuncts can fuse with CS argument positions and all that that implies, we should confirm that these *with*-phrases are really adjuncts and not arguments. Recall that *do so* replaces a verb and its arguments but leaves adjuncts behind, as (42a,b) show. With *butter, do so* leaves behind the adjunct [*with a fork*] in (42c) and, crucially, the *with*-theme (42d), which must therefore be an adjunct as well.

(42) a. *The queen eats [*butter*] and the king does so [*margarine*].
The queen will eat [butter] [*on anything*] but the king does so only [*on toast*].
The queen eats [butter] [*in secret*] and the king does so [*in public*].
The queen eats [butter] [*with a spoon*] and the king does so [*with a fork*].

b. *The queen puts [butter] [*on everything*] but the king does so only [*on toast*].
The queen puts [butter] [on waffles] [*in secret*] and the king does so [*in public*].
The queen puts [butter] [on waffles] [*with a spoon*] and the king does so [*with a fork*].

c. She butters [waffles] [*with a spoon*] and the king does so [*with a fork*].

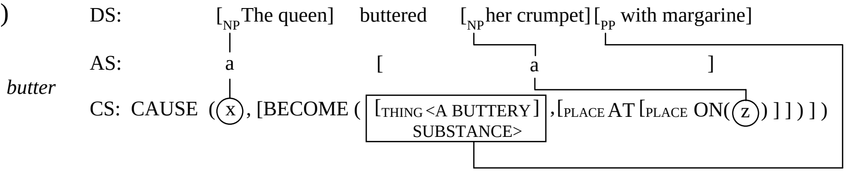
d. She butters [waffles] [*with the expensive stuff*] and he does so [*with a cheap substitute*].

Jackendoff's claim that adjuncts fuse with CS positions requires a new type of fusion, which we previewed in Chapter 1, called **Adjunct Fusion**. It is unlike **Argument Fusion**, where an XP in the syntax is identified with (or "satisfies") a position in a verb's AS, its CS fusing with the CS argument that that AS position is linked to. Rather, in Adjunct Fusion, the CS of a freely generated adjunct fuses directly into an unlinked position in a verb's CS. Adjunct Fusion is effected by a class of Adjunct Rules, such as the *With*-theme Adjunct Rule in (43).

(43) ***With*-theme Adjunct Rule**:[12] (adapted from Jackendoff, 1990:169)
Given the configuration [$_{\text{VP}}$ V . . . [$_{\text{PP}}$ with NP]]
if the verb's CS contains [. . . BE(COME) ([$_{\text{THING}}$] , [$_{\text{PLACE}}$])],
then the CS of the NP may fuse with THING.

This rule allows *with*-phrases like those in (40) to fuse with the CS of the verb they appear with without being an argument of that verb, as shown in (44).[13] (We use rectangles around the CS constituents that adjuncts fuse with to distinguish them from linking CS constituents, which are circled.)

(44)



Jackendoff imposes two conditions on his *With*-theme Adjunct Rule.

(45) **Two Conditions on Jackendoff's *With*-theme Adjunct Rule** (adapted to our notation)

Condition 1: THING is not linked to an AS position.
Condition 2: The semantic features of the NP's CS must be distinct from the semantic features on the unlinked THING with which it is fusing.

---

[12] Two things about this rule deserve mention. First, the parentheses in BE(COME) allow the rule to apply to adjectives that take *with* adjuncts, such as *The tree stayed* [*covered with icicles*], which have BE rather than BECOME in their CSs. Second, Jackendoff formulates his *with*-adjunct rule to ensure that it does not apply to verbs of removal, like *empty* or *rid*, which allow only *of*-adjuncts:

(i) *She emptied the glass with water.
(ii) She emptied the glass of water.

For us, the *butter* verbs differ from the *empty* verbs as in (iii) and (iv).

(iii) [. . . [BECOME ([$_{\text{THING}}$] , [$_{\text{PLACE}}$])]]
(iv) [. . . [BECOME ([$_{\text{THING}}$] , NOT [$_{\text{PLACE}}$])]]

If we are correct about the placement of NOT, the rule in (43) will not apply when NOT appears in the verb's CS and, instead, an *of*-adjunct rule can be formulated to apply. But nothing in our discussion here hinges on these differences between Jackendoff's representations and ours.

[13] For ease of exposition, we will sometimes talk informally about XPs fusing with CS constituents, with the understanding that it is the CS of the XP that actually fuses.

Condition 1 is designed to handle the fact that *with*-themes cannot co-occur with direct-object themes, as in (46).[14]

(46) a. *The queen put a buttery substance on her crumpet with margarine.
b. *They loaded lettuce onto the wagon with romaine.

Condition 2 expresses the fact that a *with*-PP must do more than simply satisfy the selectional restrictions on the implicit theme in the CS of the verb, as (47) shows:

(47) a. The queen buttered her crumpet *with margarine*. (= 40a)
The queen powdered her nose *with cornstarch*.

b. *The queen buttered her crumpet *with butter/a buttery substance*.
*The queen powdered her nose *with powder*.

We believe that these conditions are not necessary. First, Condition 2 need not be tacked onto this adjunct rule (and all other adjunct rules, as it is), since it is a special case of a more general Gricean-style "redundancy restriction" discussed above for arguments (see note 9, above), and it applies to adjuncts and arguments alike, not just *with*-themes. The direct objects in (48), for example, are strange without the parenthesized modifiers.[15]

(48) a. She drank a ?(strange) liquid.
b. She eats ?(organic) food.
c. She cooked ?(some exotic) food.

However, Jackendoff rejects using a more general condition, since he finds the cases in (49) equally acceptable.

(49) a. He drank some liquid.
b. He drank something.

---

[14] Notice that these are not Theta Criterion violations, which applies to arguments not adjuncts, since *with*-themes are adjuncts. The Theta Criterion would be violated by sentences like (i), because they are missing an obligatory argument. In (ii), the second (theme) argument is optional not obligatory, as we discuss further below.

(i) *The queen put on her crumpet with cheap oleo
(ii) The queen loaded/spread her crumpet with cheap oleo.

[15] Notice, though, that under certain pragmatic and discourse conditions, usually involving contrast, the offending redundancy in (47b) and (48) evaporates:

(i) Heart patient to cardiologist: I swear I *always* butter my toast with oleo. I'd never dream of buttering it with *butter*.
(ii) One linguist to another: To observe the selectional restrictions on the object of *drink*, notice that you can't drink a powder. You can only drink a *liquid*.

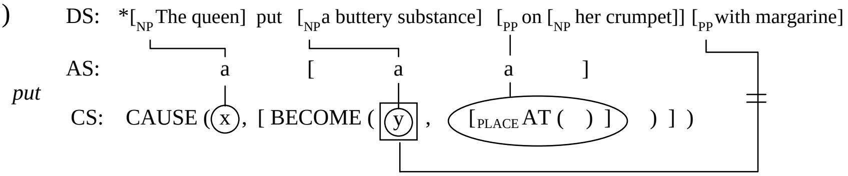
However, we find that these sentences actually favor a general condition. (49a) is acceptable only to the extent that “some” is interpreted as “unknown”: (he drank some liquid but I don’t know what it is.) And (49b) is acceptable for the same reason. So these direct objects do add more information than the direct objects in (48) without the parenthetical modifiers.

Similarly, we reject imposing condition 1 on the *With*-theme Adjunct Rule (and similar conditions on other adjunct rules, as Jackendoff does); rather, (46) is blocked by our Prohibition Against Double Fusion (PADF) which we introduced in Chapter 1, (47):

(50) **Prohibition Against Double Fusion**
Each constituent in CS can be fused with only once.

This prohibition guarantees that any material fusing into CS, either via Adjunct Fusion or Argument Fusion, must fuse with a CS constituent that is not involved in another instance of fusion. This blocks the double fusion of [a buttery substance] and [margarine] in (46), both of which are vying to fuse with the theme position in *put*’s CS:

(51)


DS: *[NP The queen] put [NP a buttery substance] [PP on [NP her crumpet]] [PP with margarine]
AS: a [a a]
put
CS: CAUSE (x), [BECOME (y), [PLACE AT ( )])])

There is a third way in which incorporated theme verbs like *butter* differ from *put*, observable from their CSs in (38) and (39). For *put*, the CS constituent that links to AS is a PLACE, so the AS can be satisfied by any syntactic XP that can denote a PLACE, typically a PP (e.g., *on her crumpet*) but also a narrow class of NPs (*this way*, *here*, *there*, *someplace*, *somewhere*).[16] (52) is ungrammatical not only because *her crumpet* cannot get case, but also because *her crumpet* is a THING, violating the selectional restrictions imposed by *put*.[17]

(52) *The queen put butter her crumpet.

In contrast, for *butter* what links is not the entire PLACE, but the THING inside it. So (53) is ungrammatical because the CS of *on her crumpet* (a PLACE) cannot fuse with the THING in the CS of *butter*.

(53) *The queen buttered on her crumpet.

---

[16] Not all NPs that designate PLACEs are possible with verbs that require them. *Home* cannot readily appear with *put* (*the queen put the kids someplace/this way/there/*home*), though it can appear with *leave*, which also selects a PLACE (*the queen left the kids someplace/this way/there/home*). We leave these subtle differences for future investigation.

[17] Notice that this account of the ungrammaticality of (52) need not refer to the direct/indirect internal argument distinction, which we eliminated in Chapter 2.

The fact that it is a THING in the CS of *butter* that links and not the PLACE containing it affects the meaning of the verb. *Butter* (and all of the incorporated theme verbs in (36)) incorporates not only its theme but also the PLACE function AT ON. *x buttered y* means something like ‘x causes a buttery substance to come to be on y’.[18]

4.2.1.2 A Related Class of Verbs: *bone*

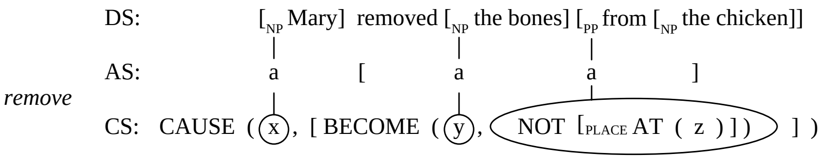
A related class of verbs with incorporated themes is the *bone* class in (54).

(54) a. Mary boned the chicken.
b. Mary pitted the cherries.
c. Mary deleaded her apartment.

These verbs appear to contain as part of their meanings the core meaning of *remove* or *detach*, whose CS, we claimed in Chapter 1, was very much like the CS of *put* or *attach*. With *put* forming the basis of our analysis of the *butter* incorporated theme verbs, a parallel treatment suggests itself for the *bone* class.

As laid out in Chapter 1, the main difference between *put* and *remove* is direction. *Put* specifies that the movement of the theme is **toward** some point or object, whereas for *remove*, the movement is **away**. We can express this difference as we did for *attach* and *detach*, by assigning *put* and *remove* parallel CSs but adding a NOT modifier on the PLACE for *remove*, as in (55). Thus, *Mary removed the bones from the chicken* means ‘Mary caused the bones to come to be NOT at the chicken.’

(55)


DS:
[$_{NP}$ Mary] removed [$_{NP}$ the bones] [$_{PP}$ from [$_{NP}$ the chicken]]
AS:
a [a a]
remove
CS:
CAUSE (x , [BECOME (y , NOT [$_{PLACE}$ AT (z)])])

The verb *bone* differs from *remove* in the same three ways that *butter* differs from *put*. First, its theme does not link to an AS position; it is incorporated.

(56) *Mary boned the cartilaginous bones from the chicken.

Second, this incorporated theme is specified (for *bone*, as BONES). Finally, it is the THING inside the PLACE that links to AS, rather than the entire PLACE. Thus, while *remove* requires a PP, *from the chicken*, *bone* requires an NP, *the chicken*. These differences show up in the contrast between the entry for *remove* in (55) and the entry for *bone* in (57).[19]

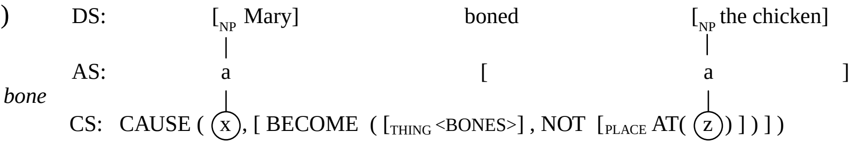
---

[18] Using a special distributive function, Jackendoff refines this meaning to express that the buttery substance actually has to be *all over the surface* of y. Although we agree, for now, we are leaving it out of our representations.

[19] The PLACE in the CS of *bone* may actually be more complex in that it incorporates the PLACE function IN, as in (i).

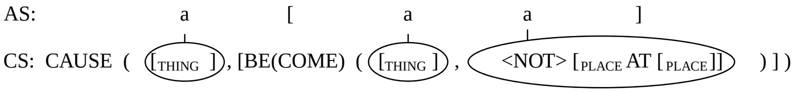
(i) CAUSE (x , [BE (COME) ([$_{THING}$ <BONES>], NOT [$_{PLACE}$ AT [$_{PLACE}$ IN (z)]])])

(57)

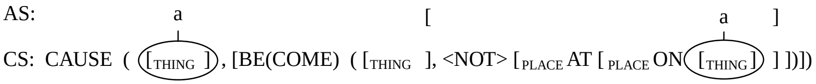

DS:
[NP Mary]
boned
[NP the chicken]
AS:
a
[
a
]
bone
CS: CAUSE (x , [BECOME ([THING <BONES>] , NOT [PLACE AT(z)])])

The linking contrast between *put* and *remove* on the one hand and *butter* and *bone* on the other, similar to the contrast between *go* and *enter*, is depicted schematically in (58). (We spell out THING instead of abbreviating it with small letter variables; we use angled brackets around NOT to indicate that it is present only for *remove* and *bone*.)[20]

(58) a. *put* and *remove*:


AS:
a
[
a
a
]
CS: CAUSE ([THING] , [BE(COME) ([THING] , <NOT> [PLACE AT [PLACE]])])

b. *butter* and *bone*:


AS:
a
[
a
]
CS: CAUSE ([THING] , [BE(COME) ([THING], <NOT> [PLACE AT [PLACE ON([THING])]])])

For both CSs, the ILH predicts straightforwardly the positions that the linking CS constituents link to. The crucial difference between (58a) and (58b) lies in which CS constituents are stipulated to link.[21]

4.2.1.3 A Reanalysis of *butter/bone* Based on *load/unload*

The CSs that Jackendoff proposes for *butter* and *bone* are not the only contenders as CSs for these verbs. In this section we suggest alternative CSs that we feel better characterize their meanings. But under our alternative CSs, though they accord with the ILH, these verbs still involve CS-AS mismatches, with CS constituents that do not link to the syntax.

Our proposal for *butter* and *bone* requires looking at the familiar pair of “*spray-load*” verbs in (59).

(59) a. They loaded hay onto the wagon.
They sprayed water on the flowers.

This would express that when we bone a chicken, we do not just take bones *from* the chicken. We take bones from *inside* it. In contrast, when we shell shrimp, we take the shells from the outside. It seems more likely to us, however, that this information is purely pragmatic and not reflected in CS.

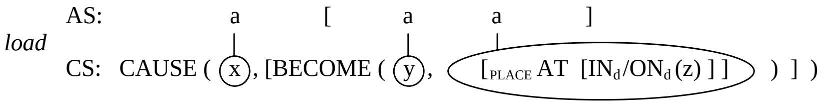
[20] These verbs are not exactly parallel to *go* and *enter* in that it is the CS argument of CAUSE, not BECOME, that links to the external argument.

[21] As we will show in Chapter 7, we do not believe that the theme links for *put* either, and this non-linking need not be stipulated; it follows from independent principles.

b. They loaded the wagon with hay.
They sprayed the flowers with water.

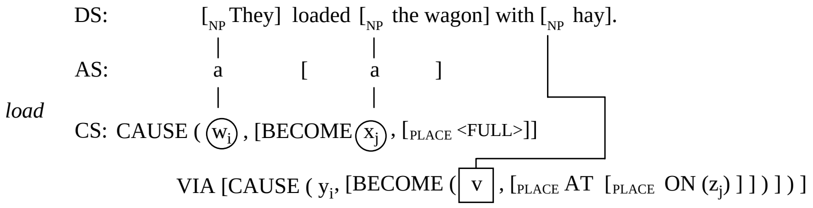
What is significant about (59a,b) is that they are not synonymous. As has been discussed by many investigators (Anderson, 1971; Tenny, 1987; Levin & Rapoport, 1988; Rappaport Hovav & Levin, 2005; Pinker, 1989), in (59b) the wagon is "wholly affected"; it becomes completely full of hay. In (59a), the wagon is simply the location to which the hay has moved, regardless of how full it becomes. Most analyses have assumed that the thematic properties of the verbs in (59a,b) are identical. Jackendoff (1989), for example, gives them both the basic CS in (60), but for (59b), though not (59a), he adds the feature "distributed" (subscript "d") on the PLACE function, signaling that the hay completely occupies the relevant space on the wagon.[22]

(60)


AS: a [a a]
load
CS: CAUSE (x , [BECOME (y , [PLACE AT [INd/ONd (z)]])])

In contrast, Rappaport & Levin (1988) give the two sentences in (59) different CSs. *Load* in (59a) is a change-of-location verb like *put* meaning 'they caused the hay to come to be at in the wagon'. *Load* in (59b) is a change-of-state verb, like *break*, but with a more complex meaning. Its core meaning 'they caused the wagon to come to be full' is modified by an embedded VIA means clause, 'by causing the hay to come to be at in it.'[23] The meaning of (59a) is thus contained in the meaning of (59b). Although Rappaport and Levin do not give a CS for this *load*, we will, in (61).

(61)


DS: [NP They] loaded [NP the wagon] with [NP hay].
AS: a [a]
load
CS: CAUSE (wi , [BECOME xj , [PLACE <FULL>]]
VIA [CAUSE (yi, [BECOME (v , [PLACE AT [PLACE ON (zj)]])])]

The wagon in (59b) is interpreted as "wholly affected" because it corresponds to the theme in the highest CS clause. As the first argument of

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[22] The CS for *put* also lacks "d", which is why *they put hay on the wagon* does not have the wholly affected reading. Jackendoff's CS for (24a) uses GO instead of BECOME.

[23] In Chapter 9, Section 4, we will give slightly different CSs for both *load hay into the wagon* and *load the wagon with hay*. But the departures we will make there from Levin & Rappaport's proposal are not relevant for the discussion here.

BECOME, themes either change location or state, i.e., they are wholly affected.[24,25]

Notice that there are two themes in (61), one in each of two BECOME clauses. The higher theme, x_j, is linked to the internal argument in the AS and corresponds to *the wagon* in DS; in the second line, another theme, v, not linked to a constituent in AS, and the CS of the PP *with hay* are associated by the *With*-theme Adjunct Rule. The theme in the main CS clause, x_j, is coindexed with z_j (the goal) in the subordinate CS clause, indicating that *the wagon* bears two thematic roles: it comes to be loaded and something (v) comes to be on it. There is a second co-indexing as well: the agent, w_i, in the top line is coindexed with the agent, y_i, in the bottom line.

The *butter* class of verbs, repeated in (62), bear a striking resemblance to the verbs in (59b).

(62) a. The queen buttered her crumpet.
b. The queen powdered her nose.
c. The queen salted her tomato.
d. The baker dusted the crullers (with confectioner's sugar).
e. The cabinetmaker lacquered the box.
f. They plastered the ceiling.
g. The runner bandaged her knee.
h. They tiled their bathroom floor

You cannot be said to have buttered your crumpet if you have put a dot, a blob, or even an entire stick of butter on one corner of it. Some socially agreed-upon portion of one of the broad surfaces of the crumpet has to be coated with the buttery substance. (In contrast, in a sentence like *The queen put butter on her crumpet, her crumpet* need not be wholly affected. Butter could be only on a tiny spot on the crumpet.)

We can account for the holistic interpretations in (62) with a CS parallel to (61), in which *her crumpet* corresponds to the theme of its verb's highest CS clause. Under this analysis, the central meaning of *x buttered y* is not 'x caused a buttery substance to come to be all over y', as Jackendoff claims, but 'x caused y to come to be in a covered state' as shown in (63).

(63) DS: [$_{NP}$The queen] buttered [$_{NP}$her crumpet]
| |
AS: a [a]
butter | |
CS: CAUSE ($\textcircled{w_i}$, [BECOME $\textcircled{x_j}$, [$_{PLACE}$ <COVERED>]])
VIA [CAUSE (y_i , [BECOME ([$_{THING}$ <A BUTTERY SUBSTANCE>] , [$_{PLACE}$ AT [$_{PLACE}$ ON (z_j)]])])]

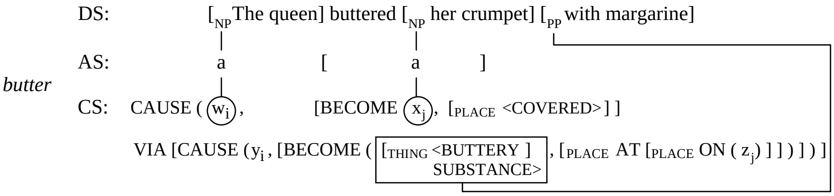
---

[24] Although some investigators (e.g., Tenny, 1987) have attributed the wholly affected interpretation to direct-objecthood, under our analysis direct-objecthood is a by-product, not the cause of this interpretation, since themes usually (though as we will see, not always) link to the internal argument position, which corresponds to the direct object position in the syntax.

[25] Hale & Keyser (2002) also acknowledge two separate structures for these verbs, which they call "verbs of putting" versus "verbs of getting". Juarros (2003) extends their analysis, using data from the locative alternation in Spanish. For other analyses see also Baker (1997), Basilico (1998), Brinkmann (1997), Dimitrova-Vulchanova (1998), Laffut (1997, 1998, 1999), Stroik (1996), Hale and Keyser (2002) and Kiparsky (1997) and, for an excellent overview, Arad (2006).

The only difference between (63) and (61) is that in (63) the theme in the modifying VIA means clause has a selectional restriction on it.[26] While anything can end up on the wagon, only a <A BUTTERY SUBSTANCE> can end up on the crumpet. *The queen buttered her crumpet* means 'The queen caused her crumpet to come to be covered by [causing a buttery substance to come to be on it]'. When the *With*-theme Adjunct Rule applies, as in (64), the selectional restriction <A BUTTERY SUBSTANCE> will delimit what theme can occur.

(64)


DS:
[NP The queen] buttered [NP her crumpet] [PP with margarine]
AS:
a [a]
butter
CS:
CAUSE (wi ,
[BECOME (xj , [PLACE <COVERED>]]
VIA [CAUSE (yi , [BECOME ([THING <BUTTERY SUBSTANCE>] , [PLACE AT [PLACE ON (zj)]])])]

And this treatment extends to *bone*, which is parallel to *unload* just as *butter* is parallel to *load*. The major difference, as noted above, is that in the CSs for *bone* and *unload*, NOT modifies the outer PLACE.

Notice that this alternative CS for *butter* still involves a CS-AS mismatch – two, in fact. First, the incorporated theme <A BUTTERY SUBSTANCE> does not link to the AS. It fuses directly with the CS of the PP as an adjunct. Second, two non-linking arguments in a lower CS clause are coindexed with arguments in the higher clause, as we saw with *buy* and *sell*. Note, too, that this alternative CS-AS linking pattern also conforms to the ILH ((6) in Chapter 3) and to the Bound Argument Condition (introduced in Chapter 1, (27), and discussed further in Section 3, below). w is higher than x, so they link to external and internal positions, respectively. And the higher of the two pairs of co-indexed arguments, w_i and x_j, link.

Notice that if our CSs for verbs like *butter* and *bone* are correct, then the "incorporated theme" in this set of verbs is not the theme of the highest BECOME clause, which links to AS and corresponds to the direct object NP (e.g. her crumpet). What is incorporated is the theme in the lower modifying CS clause. In sum, verbs like *butter* and *bone*, under this reanalysis, involve a non-linking theme, but in an embedded CS clause.

4.2.2 More Incorporated Theme Verbs: *ticket, leaflet, stone, gas*

A second class of incorporated theme verbs are the denominal verbs in (65).

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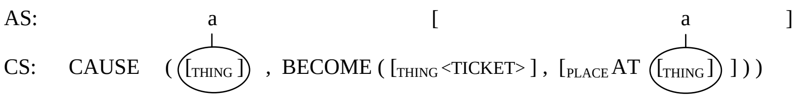
[26] Notice that this modifying means clause is identical to the CS we originally gave for *butter* back in (39). That is, it is a causative change-of-location clause with the incorporated theme <A BUTTERY SUBSTANCE>.

(65) The meter maid ticketed that car.
The activists leafleted the crowd.
The police stoned the demonstrators.
The soldiers gassed the villagers.

Though these verbs are similar to the *butter* class, they do not have the same holistic interpretation; rather, their CSs appear to be parallel to our CS in our original (rejected) analysis of *butter* in (39), parallel to *put*, in which the direct object corresponds to the THING inside the PLACE, as shown in (66).

(66)


AS:
a
[
a
]
CS:
CAUSE ([THING] , BECOME ([THING <TICKET>] , [PLACE AT [THING]]))

These verbs link transitively with one external and one internal argument, in line with the ILH. But the theme is incorporated; it cannot link to an argument position. The sentences in (67), in which it appears as a direct object, are ungrammatical.

(67) *The meter maid ticketed [a hefty parking fine] on that car.
*The activists leafleted [red fliers] to the crowd.
*The police stoned [sharp rocks] at the demonstrators.
*The soldiers gassed [teargas] at the villagers.

But the theme **can** be expressed as a PP adjunct, as shown in (68). The *do so* test in (69) confirms that these PPs are adjuncts and not arguments.

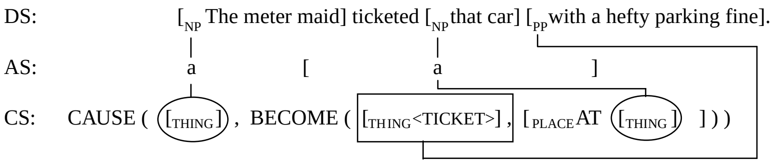
(68) The meter maid ticketed that car [with a hefty parking fine].
The activists leafleted the crowd [with red fliers].
The police stoned the demonstrators [with sharp rocks].
The soldiers gassed the villagers [with teargas].

(69) a. A meter maid ticketed that car [with a hefty parking fine] [yesterday], then a traffic cop did so [with an even stiffer fine] [today]

b. *A meter maid ticketed that car [with a hefty parking fine] [yesterday], then a traffic cop did so [today]

The same *With*-theme Adjunct Rule that associates the PP and the non-linking theme for the *butter* verbs would apply here. After fusion creates the CS of *a hefty parking fine*, Adjunct Fusion will fuse the content of that CS with the CS of <TICKET> in the verb's CS.

(70)


DS:
[NP The meter maid] ticketed [NP that car] [PP with a hefty parking fine].
AS:
a
[
a
]
CS:
CAUSE ([THING] , BECOME ([THING <TICKET>] , [PLACE AT [THING]]))

These incorporated theme verbs are unlike the *butter/bone* verbs above in one respect. For those verbs the theme that failed to link was in a subordinate CS clause; the theme in their highest clause linked. These verbs have only one CS clause and therefore only one theme. So the "incorporated theme" verbs that we have seen so far comprise two types of non-linking themes, from verbs with different CS geometries.[27]

4.2.3 Incorporated Concrete PLACE Verbs: *bag, box, bottle, file, shelve*

Verbs with incorporated PLACEs provide another case of a mismatch in the number of CS arguments and syntactic arguments.[28] We have just seen two classes of verbs whose incorporated theme can be optionally expressed in an adjunct that fuses with the CS of the verb, *butter* and *ticket*. The incorporated PLACE verbs in (71) are denominal verbs whose unlinked CS argument, like the theme for those verbs, is annotated with very specific semantic features.

(71) a. Some shoppers bag their own groceries.
b. This machine boxes cigars.
c. They bottle their home-made beer themselves.
d. I filed the letter.
e. Marion shelved the dictionaries.

But here, the unlinked argument is the PLACE. *x bagged y* means 'x causes y to come to be in BAGs.' Our analysis of these verbs, in (72), is similar to the "*put*" analysis of *butter*-class verbs in (39). The linking pattern obeys the ILH; the higher x is external, the lower y, internal.

(72) DS: [$_{\text{NP}}$ Some shoppers] bag [$_{\text{NP}}$ their own groceries]
AS: a [a]
bag
CS: CAUSE (ⓧ , [BECOME (ⓨ , [$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ IN [$_{\text{THING}}$ <BAGS>]]])])

Like the incorporated theme for *butter*, the incorporated PLACE for *bag* can be optionally expressed in an adjunct PP:

(73) a. Some shoppers bag their own groceries *in plastic bags*.
b. This machine boxes cigars *in cardboard cartons*.
c. They bottle their home-made beer *in plastic bottles*.

---

[27] We have not discovered any two-theme incorporated theme verbs whose higher theme fails to link, but whose lower theme does. But this is certainly a possibility.

[28] These are Clark & Clark's (1979) "location" verbs, see also Hale & Keyser (2002) and Juarros (2003).

d. I filed the letter *in the income-tax file*.
e. Marion shelves dictionaries *on the top shelf*.

The question is how to treat this PP.

4.2.3.1 Jackendoff's Analysis

On the basis of cases like (74), Jackendoff argues that the semantic features on the implicit PLACEs in (71) act as selectional restrictions on the optional PPs expressing PLACE, since PPs that violate them are not allowed.

(74) a. *Some shoppers bag their groceries *in melon crates*.
b. *This machine boxes cigars *in cellophane wrappers*.
c. *They bottle their home-made beer *in kegs*.
d. *I filed the letter *in my sweater drawer*.
e. *Marion shelves dictionaries *on the floor*.

This would be predicted if these PPs were fusing with the PLACE in the CSs of these verbs. Like the adjunct fusion for *butter*-class verbs, Jackendoff proposes that this fusion is not mediated by the AS of these verbs but rather by a separate "PP-Adjunct Rule".

(75) **PP-Adjunct Rule** (adapted from Jackendoff 1990, p. 170)
Given the syntactic configuration [$_{\text{VP}}$ V . . .[$_{\text{PP}}$ Prep NP]]
if the verb's CS contains [. . .BE(COME) ([$_{\text{THING}}$] , [$_{\text{PLACE}}$])]
the CS of the PP may fuse with PLACE.

Two conditions on this rule block (76a,b), parallel to the conditions on the *With*-theme Adjunct Rule above.

(76) a. *Some shoppers put their groceries in boxes in melon crates.
b. *Some shoppers bag their bulk grains in bags.

(77) **Two Conditions on Jackendoff's PP-Adjunct Rule** (adapted to our notation)

Condition 1: PLACE is not linked to an AS position.
Condition 2: The semantic features of the PP's CS must be distinct from the semantic features on the unlinked PLACE with which it is fusing.

Condition 1 prevents the rule from applying when a verb's PLACE already links via argument fusion (e.g., *put*). Condition 2 rules out adjuncts that add no new features and are, therefore, redundant. We believe that like the conditions on the *With*-theme Adjunct Rule, above, these conditions are unnecessary. (76a) is handled by our Prohibition Against Double Fusion and (76b) is ruled out by the general Redundancy Restriction (Randall, 1982a) discussed for *butter* above.

Note that since this PP is an adjunct, not an argument, the Theta Criterion has nothing to say about it nor does the ILH. And its adjunct status is confirmed by the *do so* test in (78), which leaves these PPs behind (recall that *do so* replaces the verb and all of its arguments):

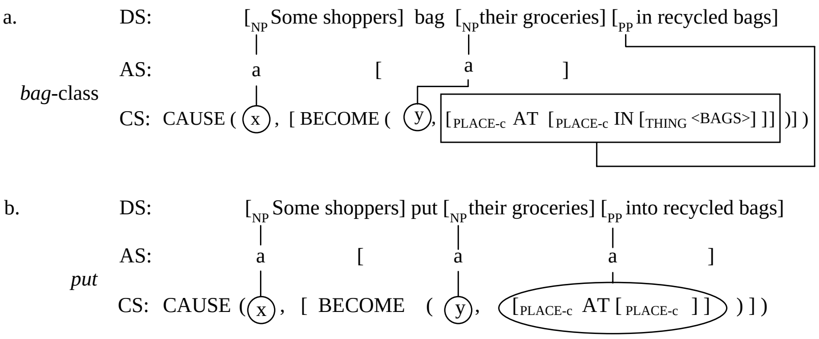
(78) a. This cashier bags groceries *in plastic bags*; that cashier *does so in paper bags*.
b. That company used to box its cigars *in cardboard boxes*; now it *does so in styrofoam ones*.
c. That brewery bottles its ale *in plastic bottles*; this one *does so in glass bottles*.

There is one other fact to be explained about how fusion works with these verbs. If they have the same basic CS as *put*, then what prevents them from allowing the same range of prepositions, specifically those containing *to*: *into, onto,* and *to*? Instead they allow only prepositions that appear with BE verbs:

(79) a. Some shoppers bags their groceries in(*to) recycled bags.
b. This machine boxes cigars in(*to) cardboard boxes.
c. They bottle their home-made beer in(*to) plastic bottles.
d. I filed the letter in(*to) the income-tax file.
e. Marion shelves dictionaries on(*to) the top shelf.

Suppose that the *bag*-class verbs in (79a) share *put*'s skeletal CS, including their complex PLACE, as Jackendoff proposes. The crucial difference is which portion of this PLACE the CS of the PP fuses with. For *put*, in (80b), it is the outer PLACE constituent; for the *bag*-class in (80a), it is the inner PLACE, which is compatible only with prepositions that have pure location readings such as *in* and *on*:

(80)


a.
DS: [NP Some shoppers] bag [NP their groceries] [PP in recycled bags]
AS: a [a]
bag-class
CS: CAUSE (x , [BECOME (y , [PLACE-c AT [PLACE-c IN [THING <BAGS>]]])])
b.
DS: [NP Some shoppers] put [NP their groceries] [PP into recycled bags]
AS: a [a a]
put
CS: CAUSE (x , [BECOME (y , [PLACE-c AT [PLACE-c]])])

The CSs of the two types of prepositions are shown in (81).[29]

(81) a. *into* [PLACE-c AT ([PLACE-c IN ([THING])])]
b. *in* [PLACE-c IN ([THING])]

This explains the difference between the possible PPs of the two verb classes.

---

[29] Recall from Chapter 1, (72), that prepositions like *under* have two representations. Similarly, *in* can be represented as in both (81a) and (81b), which explains why *put* can appear with both *in NP* and *into NP*, but *bag* can appear only with *in NP*.

4.2.3.2 Fusing Adjuncts vs. Peripheral Adjuncts: two distinct types

Before leaving this class of verbs, we need to address one more issue. If selectional restrictions limit the adjunct PP that can occur with *bag*-class verbs to only those whose CS matches the verb's, such as (82), how do we analyze cases like (83) in which this is not the case?

(82) a. Do you want me to bag your groceries *in plastic bags or paper bags*?
b. That company now boxes its cigars *in styrofoam boxes instead of cardboard boxes*.
c. That brewery bottles its ale *in plastic bottles instead of glass bottles*.
d. I filed the letter *in the income-tax file*.
e. Marion shelves dictionaries *on the top shelf*.

(83) a. Sam bags groceries *in the warehouse*; Mary bags groceries *in the checkout line*.
b. That company now boxes its cigars *in a climate-controlled room*.
c. That brewery bottles its ale *in a state-of-the-art factory*.
d. I filed the letter *in the storeroom*.
e. Marion shelves dictionaries *under the reference desk*.

In (83e), for example, the CS of the PLACE PP *under the reference desk* does not overlap with the [PLACE-c AT ([PLACE-c ON SHELVES])] in the verb's CS. So it cannot be fusing with the implicit PLACE in the verb's CS, despite our intuition that in that sentence the dictionaries do end up on shelves.

Rather, these adjunct PPs, we claim, are **not** fusing with the CS of the verb; rather they are tacked on as "peripheral adjuncts", adding another location that modifies the entire event. The implication that the books are going onto shelves comes from the verb itself, just as when there is no PP at all, as in *Marion shelved the dictionaries*. This possibility certainly must be available for the creation verbs in (84), whose *on*-PP and *in*-PP adjuncts cannot be fusing with any portion of the verbs' CSs.[30]

(84) a. She painted a mural on the side of the building.
b. She drew a picture on the wall.
c. She wrote her name in the wet concrete.

Since these creation verbs are not change-of-location verbs, their PPs are not goals but static locations. They would be treated like the location PPs on other verbs that can take locations, in (85), headed by a range of prepositions:

(85) a. She painted her fingernails [on the train].
b. She wrote poetry [in the kitchen].

---

[30] Notice that these verbs can be turned into change-of-location verbs, as in (i), with a corresponding shift in argument structure. But then the PP it takes is not an adjunct but an argument, headed by *to*, indicating that what is fusing is a complex PLACE.

(i) The secret agent painted the microchip onto/*on the oil painting.

c. She bought a parasol [at a flea market].
d. She washed the sand off of her feet [outside].
e. She fixed her bicycle [under the tree].

But if the cases in (83) are analyzed as peripheral adjuncts, they raise the possibility that the ones in (82) should be, too. It would then be pragmatic considerations that limit the content of their PPs. However, syntactic order tests show that this is incorrect. True peripheral adjuncts cannot precede fusing adjuncts. As such, the ungrammatical cases in (86a) in contrast to (86b), demonstrate that the PPs in (82) are indeed fusing.

(86) a. *She bagged the groceries [in the warehouse] [in plastic bags].
*That company boxes its cigars [in a climate-controlled room] [in styrofoam boxes].
*That brewery bottles its ale [in a state-of-the-art factory] [in plastic bottles].
b. She bagged the groceries [in plastic bags] [in the warehouse].
That company boxes its cigars [in styrofoam boxes] [in a climate-controlled room].
That brewery bottles its ale [in plastic] [in a state-of-the-art factory].

Let us turn to another, trickier, class of PPs, in (87).

(87) a. Do you want me to bag your groceries *in plastic or paper*?
b. That company now boxes its cigars *in styrofoam instead of cardboard*.
c. That brewery bottles its ale *in plastic instead of glass*.

Although they do not overtly express the words that are incorporated in the verb, the PPs in (87) are more like those in (82) than (83). For (87a), for example, we have the intuition that the PP means ‘plastic or paper *bags*’, not just plastic or paper. But perhaps these adjuncts are peripheral and this intuition is coming from pragmatic felicity.

However, here, too, as (88) shows, these PPs must precede peripheral adjuncts. Thus they themselves must also be fusing adjuncts.

(88) a. *She bagged the groceries [in the warehouse] [in plastic].
*That company now boxes its cigars [in a climate-controlled room] [in styrofoam].
*That brewery bottles its ale [in a state-of-the-art factory] [in plastic].

b. She bagged the groceries [in plastic] [in the warehouse].
That company now boxes its cigars [in styrofoam] [in a climate-controlled room].
That brewery bottles its ale [in plastic] [in a state-of-the-art factory].

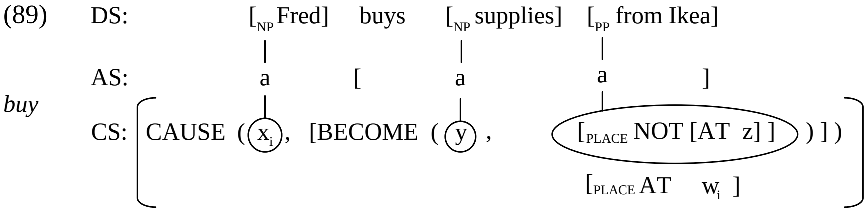
This leaves open the question of **how** these PPs are construed as involving the incorporated CS element – for the first sentence in (88a), a bag or bags. Whatever is responsible, though, will not extend to the ungrammatical cases in (74), which actually specify a different PLACE (e.g., *melon crates* in (74a)).

In sum, the *bag*-class is another example of verbs with a CS argument that does not map to a syntactic position. And as we have shown, with or without its fusing adjunct, its linking obeys the ILH. The higher x in (80a) links externally; the lower y, internally. The fusing adjunct does not link.

4.3 Coindexed Argument Verbs and the Bound Argument Condition on Linking

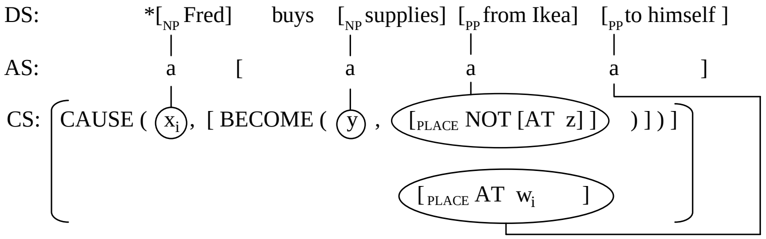
In Chapter 1 we discussed *buy* and *sell*, both of which have an argument in CS that does not link to the syntax, but is coindexed with the agent. For *buy* it is the goal, as shown in (89).

(89)


DS: [NP Fred] buys [NP supplies] [PP from Ikea]
AS: a [a a]
buy
CS: CAUSE (xi, [BECOME (y, [PLACE NOT [AT z]])])
[PLACE AT wi]

If this argument links, as in (90), the result is ungrammatical.

(90)


DS: *[NP Fred] buys [NP supplies] [PP from Ikea] [PP to himself]
AS: a [a a a]
CS: CAUSE (xi, [BECOME (y , [PLACE NOT [AT z]])])]
[PLACE AT wi]

It was the ungrammaticality of this sentence that led us to first propose the Prohibition Against Double Fusion (PADF), (91) (from (47) in Chapter 1).

(91) **Prohibition Against Double Fusion**
Fusion cannot apply more than once to a CS constituent.

Recall that the problem was not the Theta Criterion; *Fred* corresponds to the agent; the PP corresponds to the goal. But the coindexing on these two CS constituents means that the CS of the NP *Fred* fuses with both CS positions, preventing the PP from also fusing with the goal.

Though the PADF was necessary, as we saw earlier in this chapter, to rule out the double fusion of adjuncts, it might be tempting to claim that the problem with *buy* and *sell* is not the PADF, rather it is with having 3 postverbal arguments. And it is clear from (92) that both the goal and the source are, in fact, arguments.

(92) a. *The US buys oil from Saudi Arabia and Canada does so from Iran.
b. *Saudi Arabia sells oil to the US and Iran does so to Canada.

But verbs parallel to *buy* in all relevant ways except for coindexing allow both the source and goal to link:

(93) The movers got the antiques from New Hampshire to Boston.
Fred took the groceries to the kitchen from the car.
The librarian carted the books into the library from the after-hours drop box.
She carried the sleeping baby from the car seat to the crib.

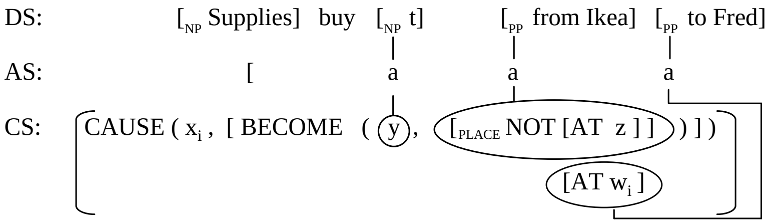
And when the goal in one of the verbs in (93) turns out to be identical with the agent, there is still no violation, because the CS of *get* does not specify coindexing:

(94) Fred got some supplies [from the warehouse] [to himself] (by phoning the company).

This confirms that the problem is in fact the PADF, not the number of arguments.[31]

When we first discussed these verbs in Chapter 1, we had not yet proposed the ILH, which we introduced in Chapter 3. Reconsidering these verbs now, the linking of the agent to the external argument and the theme and source to internal positions is predicted. Of course, which of the arguments link is stipulated, as it is for all verbs. But now we might ask whether, given the coindexing of the agent and goal, it would be possible to link the goal argument instead of the agent, with the output in (95). Under this linking, the verb would be unaccusative, since the arguments of BECOME are all at the same CS level and would map to the same level at AS. But the sentence is ungrammatical. However, here the PADF is not violated: the agent does not link, so it is fused with only once, as a result of being coindexed with the linking goal.

(95)


DS:
[NP Supplies] buy [NP t] [PP from Ikea] [PP to Fred]
AS:
[a a a]
CS:
CAUSE (xi , [BECOME (y , [PLACE NOT [AT z]])])
[AT wi]

Rather, the problem seems to be in linking the more deeply embedded of the two co-indexed arguments. As we previewed in Chapter 1, it appears that when two arguments are coindexed in CS, the higher (less embedded) one links; the lower one remains implicit (Carrier-Duncan, 1985). We called this the *Bound Argument Condition* in Chapter 1 (27), and we repeat it in (96).

---

[31] Similar cases of what appear to be two PPs have been analyzed as single constituents (Jackendoff, 1973; Emonds, 2000). However, the PPs in those cases have a fixed order, as shown in (i) (these come from Emonds, Chapter 8) while those in (93) are reversible, as shown in (ii):

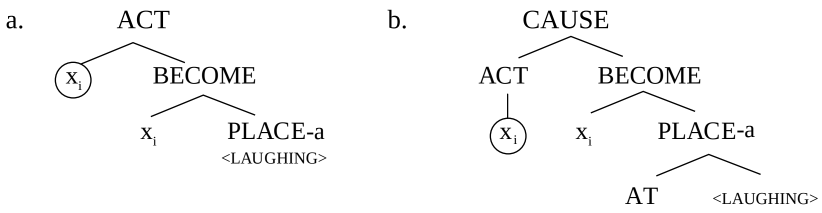
(i) The tenants dashed [out of the house] [from the fire]
*The tenants dashed [from the fire] [out of the house]
(ii) The movers got the antiques [to Boston] [from New Hampshire].
Fred took the groceries [from the car] [to the kitchen].

Moreover, if the two PPs of *buy* and *sell* were analyzed as a single PP, this would only further support the PADF.

(96) **Bound Argument Condition**:
Given two bound CS arguments, only the higher one is eligible to link to an AS position.

Further evidence for this idea were the CSs for unergative verbs like *laugh* suggested in Chapter 3, Section 4.2 in which two arguments were co-indexed. The skeletal representation for these verbs is (97):

(97)



Again, the linking argument is the higher x, as was confirmed by the tests for unaccusativity and unergativity. In the next section, we will see that the Bound Argument Condition holds of two other classes, reflexive verbs and reciprocal verbs.[32]

Since whether or not a given CS argument links is not completely predictable, we will continue to designate the higher of the two coindexed arguments as linking. But to the extent that (96) holds, it explains the non-linking of co-indexed arguments across the lexicon.

To return to our main line of discussion, coindexed CS arguments are one more type of implicit CS argument, and unlike the others we have seen, this type **cannot** link to the syntax.

4.4 Delinked CS Arguments: Mismatches Introduced By Word-Formation Rules

Word formation typically involves the inheritance of the CS of a base word into the CS of the derived word. In the last chapter, we saw a number of rules (Causative Formation in various languages and English *out*-prefixation) that create new verbs by embedding an input verb's CS as the second argument of a higher predicate. In accordance with the ILH, the newly added argument, highest in CS, links to the highest external AS position, delinking the original, inherited, agent. In all cases, the delinked argument relinks only if the output conforms with the ILH. In Tagalog, relinking is blocked, because the linking of the other arguments of the base verb are inherited with their linking lines, so the delinked argument is expressed in an adjunct. In Chichewa-B the delinked argument relinks internally, dislodging other inherited arguments in the process, which become implicit.

---

[32] We agree with a reviewer who notes that it is not possible to distinguish empirically between (a) coindexing two CS constituents plus mapping the most prominent of the two and (b) mapping both to a single argument position. But (a) seems less stipulative than adopting (b) for only coindexed constituents (so as not to run aground on the PADF, which is needed in general). Also adopting (a) would allow for parametric differences with languages that, this reviewer suggests, link the lower of two coindexed constituents, for example, Romance reflexives, which are usually analyzed as unaccusative. See note 37, below.

This section will focus on several English word-formation rules that delink an AS argument and inherit the linking of the remaining inherited arguments. We will see that though their outputs differ in how (and whether) the delinked argument is expressed, they all conform to the requirements of the ILH.

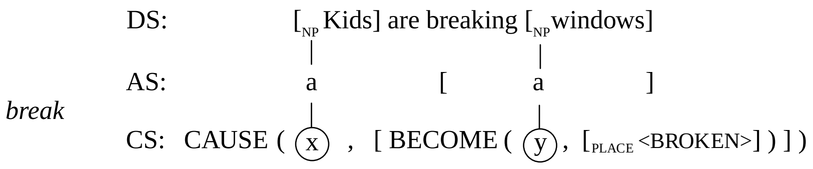
4.4.1 Delinked External Arguments: Passive Verbs, Middle Verbs and Deverbal Nominals

We first looked at Passive Formation, Middle Formation, and Nominal Formation in Chapter 2, when we used them as diagnostics for internal arguments. These three rules, though independent lexical operations, work similarly: they suppress (or delink) the external AS argument of their input, deriving forms with an unexpressed implicit CS argument. We will see that the rule-derived outputs of these lexical word-formation rules have the same properties as the verbs with implicit arguments that we saw earlier in this chapter that are not derived by rule.

4.4.1.1 Passive Verbs

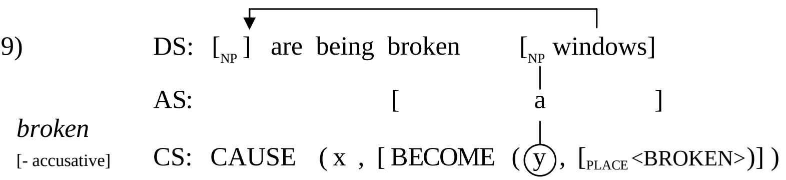
The so-called "movement" analyses of the passive construction claim that two components of the grammar are involved in the "promotion" effects of passive. In the lexicon, Passive Formation applies to an active verb like *break* in (98), by eliminating the external AS argument position and stripping the verb of its ability to assign accusative case.

(98)


DS: [$_{NP}$ Kids] are breaking [$_{NP}$ windows]
AS: a [a]
break
CS: CAUSE (x , [BECOME (y , [$_{PLACE}$ <BROKEN>])])

In CS terms, the rule delinks the CS argument linked to the external AS position, here, the first argument of CAUSE. The output is (99).

(99)


DS: [$_{NP}$] are being broken [$_{NP}$ windows]
AS: [a]
broken
[- accusative]
CS: CAUSE (x , [BECOME (y , [$_{PLACE}$ <BROKEN>)])

Since the D-Structure object needs case, it moves to the subject position. Stating Passive Formation in these terms accounts for the range of thematic roles of the implicit argument, which can be an agent, as in (99), but also a goal, source, or experiencer, whatever the external AS argument was linked to.

(100) a. Windows are being broken. (agent)
b. Threatening phone calls have been received. (goal)
c. This wallet was lost at last night's meeting. (source)
d. The shock waves were felt within 50 miles of the epicenter. (experiencer)

Technically speaking, there are two ways that the rule could work. It could erase the linking circle around the highest CS argument, which would trigger the erasure of the external AS argument.[33] Or it could directly erase the AS external argument, which would trigger the delinking of the CS agent. Whichever view we take, Passive Formation eliminates the external argument position in AS, while leaving the CS constituent it was linked to intact, creating a CS-AS mismatch and an implicit argument in the meaning of the passive. And either way, any other arguments are inherited, together with their linking lines.

The implicit argument that results from this operation can now be expressed in an adjunct, as in (101), using a passive *By*-Adjunct Rule (as in Jackendoff, 1990) parallel to the *With*-theme Adjunct Rule for *butter*.

(101) a. Windows are being broken [by kids].
b. Threatening phone calls have been received [by several members].
c. This wallet was lost [by someone at last night's meeting].
d. The shock waves were felt [by everyone within 50 miles of the epicenter].

However, unlike that rule, which requires fusion with a particular thematic role, the CS of the NP in the *by*-phrase fuses with the unexpressed, delinked argument in CS, regardless of its thematic role, but obeying any selectional restrictions on it. So *the stick was broken* [*by sincerity*] is ungrammatical for just the same reason as [*sincerity*] *broke the stick*.

Jackendoff's formulation of the passive *By*-Adjunct Rule references a CS argument in his "affect" tier. Though we will not state an alternative rule formally, we propose instead that the CS of the NP in the *by*-phrase fuses with whatever CS argument has been delinked, following the geometry of CS. This will be the highest unlinked THING in the passive verb's CS.

Whether or not the delinked argument is expressed in an adjunct, as predicted, the delinked argument never relinks to an internal argument position, even when there is one available, because the higher CS argument cannot link at the same AS level as the lower CS argument. So outputs like (102) do not occur.

---

[33] Under this account one might wonder why the CS constituent linked to the internal argument does not relink to the external AS position. We take the position pursued in Carrier-Duncan (1985) that linking lines are inherited and only altered when required by linking conventions. This same explanation holds for the rules below.

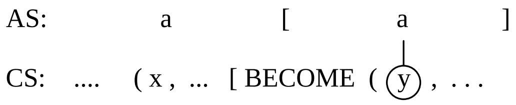
(102) a. *Windows are being broken of kids.
b. *Threatening phone calls have been received to several members.
c. *This wallet was lost from someone.

As such, the output of Passive Formation obeys the ILH.

4.4.1.2 Middle Verbs

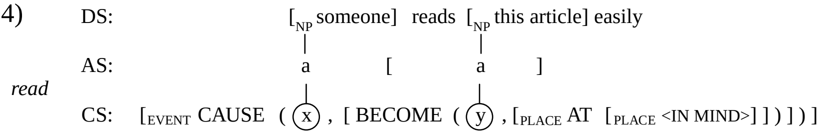
Middle Formation is another rule that involves the delinking of an external argument. As discussed in detail in Chapter 2, the rule requires a CS input whose theme links to an internal AS argument, as in (103), and embeds it into another CS.

(103)



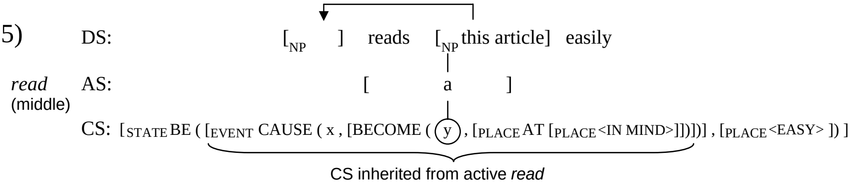
A verb like *read* satisfies this requirement:

(104)


DS: [NP someone] reads [NP this article] easily
AS: a [a]
read
CS: [EVENT CAUSE (x , [BECOME (y , [PLACE AT [PLACE <IN MIND>]])])]

When Middle Formation applies, like Passive Formation, it delinks the external AS argument and removes the case-assigning properties of the verb. The postverbal NP then moves to receive case.

(105)


DS: [NP] reads [NP this article] easily
read (middle)
AS: [a]
CS: [STATE BE ([EVENT CAUSE (x , [BECOME (y , [PLACE AT [PLACE <IN MIND>]])])] , [PLACE <EASY>])]
CS inherited from active read

Though the partial CS in (105) is just meant to be suggestive, it expresses the fact that the CS of the input verb is inherited, and its theme continues to link to the internal argument position. The new middle CS is stative, and can be roughly paraphrased as, '[for someone to read this article] is easy.'[34] The CS agent, x, originally linked to the external argument position, becomes implicit, and the output contains one more argument in CS than AS, but the linking of the derived middle is still consistent with the ILH.

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[34] We are not committing ourselves to a particular CS of middle verbs, but the fact that middle verbs express a property of their argument could come directly from the aspectual change that results when an event verb becomes a stative verb. (ii), below, contains the same event verb as (i),

One more thing to note about how Middle Formation applies: unlike passives, middles cannot express their unexpressed argument in a *by*-phrase adjunct.

(106) a. This article reads easily *[by everyone].
b. This bread cuts readily *[by experienced bakers].
c. This bread cuts readily *[by any knife].

This is a result of how the Passive *By*-Adjunct Rule is formulated: it applies to a verb's passive participle form; middles have the wrong morphology. However, interestingly, when the implicit argument in a middle can be construed as an instrument, as in (106c), it can appear in an instrumental *with* adjunct phrase.

(107) This bread cuts readily with any knife.
Tomato stains will wash out completely with Borax.
This table wipes clean easily with a wet paper towel.

Though we will not propose one here, an adaptation of Jackendoff's *With*-PP Instrumental Adjunct Rule (parallel to the other adjunct rules that we have adapted to our framework) would apply (see Jackendoff, 1990:188).

So with or without the adjunct, the CS derived by Middle Formation links its one remaining argument internally, following the requirements of the ILH.

4.4.1.3 Deverbal Nominals

A third word-formation rule that suppresses a verb's external AS argument is Nominal Formation.[35] Though we will provide only a sketch, at the CS level Nominal Formation embeds a CS like (108) under ACT OR RESULT OF V, where "V" is the CS of the verb, delinking the CS argument that is linked to the external position in AS, with the result in (109).

(108) *procrastinate*
AS: a [ ]
|
CS: [$_{\text{EVENT}}$ … ⓧ …]

(109) *procrastination*
AS: [ ]
CS: [ACT OR RESULT OF [$_{\text{EVENT}}$ … x …]]

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but it is not understood as expressing an event; rather it has a habitual reading, and expresses a property of Liz.

(i) Liz sat in the front row.
(ii) Liz sits in the front row.

[35] Our analysis borrows heavily from Grimshaw (1990). However she frames her insights in terms of Event Structure, not Conceptual Structure, though she claims to believe in it.

However, that CS argument remains in the inherited portion of the derived nominal's CS, and is therefore understood implicitly. This is clear from the meaning of *procrastination* in (110b): someone is doing the procrastinating.

(110) a. The students procrastinated.
b. the procrastination

The implicit argument is now available to fuse via a variety of adjunct rules. Determiners, *of*-PPs and *by*-PPs all appear to obey the selectional restriction on the verb. For *procrastination*, the agent must be animate:

(111) a. the students/*the difficulty procrastinated
b. the students'/*the difficulty's procrastination
c. the procrastination of the students/*of the difficulty
d. the procrastination by the students/*by the difficulty

But whether an adjunct appears or not, the nominal has one CS argument that is not linked to an AS position. Thus the output of Nominal Formation is consistent with the ILH.

4.4.2 Delinked Internal Arguments: Reciprocal Verbs and Reflexive Verbs

In Section 3 of this chapter, we discussed the verbs *buy* and *sell*, whose CSs contain two coindexed THINGs, only one of which links to AS. For those verbs, two CS constituents correspond to a single AS position – and thus to a single XP in the syntax. This was permitted by our Bound Argument Condition of Chapter 1 (27), repeated in (112).

(112) **Bound Argument Condition**:
Given two bound CS arguments, only the higher one is eligible to link to an AS position.

We now turn to two other kinds of verbs that involve two coindexed CS constituents corresponding to one AS position, reciprocal verbs like *kiss* and reflexive verbs like *wash*. However, as we will see, here the coindexing is introduced by a lexical word-formation process that delinks a CS argument. These verbs are similar to the passives, middles and nominals above, except that their argument delinks from an internal rather than an external AS position.

When the transitive verbs in (113) occur without objects, as in (114), their missing argument is implicit, understood as a reciprocal bound by the plural subject. *Troilus and Cressida kissed* in (114a) means 'Troilus and Cressida kissed each other.'

(113) Transitive Verbs
a. Troilus kissed Cressida.
b. Romeo met Juliet.
c. The cellist embraced the conductor.

d. Mohammed Ali boxed with Joe Lewis.
e. A Japanese Sumo champion wrestled an American Sumo champion.
f. Othello hugged Desdemona.

(114) Implicit Reciprocal Object Verbs
a. Troilus and Cressida kissed.
b. Romeo and Juliet met (at the well).
c. The cellist and the conductor embraced.
d. Mohammed Ali and Joe Lewis boxed.
e. A Japanese Sumo champion and an American Sumo champion wrestled.
f. Othello and Desdemona hugged.

When the transitive verbs in (115) occur without objects, as in (116), they are interpreted as having a reflexive implicit object. So (116a), *the mechanic washed*, means ‘the mechanic washed himself’. Even with a plural subject, the implicit object is reflexive not reciprocal: *the mechanics washed* means ‘the mechanics washed themselves’ not ‘. . .each other’.

(115) Transitive Verbs
a. The mechanic washed the car.
b. The cyclist shaved his legs to prepare for the bike race.
c. The surfers showered themselves after a day at the beach.

(116) Implicit Reflexive Object Verbs
a. The mechanic washed.
b. The men didn’t shave during the entire camping trip.
c. The surfers showered after a day at the beach.

It is clear from how these two implicit verb classes form resultatives that they are unergative. Unlike unaccusatives, whose postverbal NP trace in the syntax licenses predication of the result phrase (*The toast burned t black*), these verbs add a postverbal NP. This means that they do not have an internal argument in AS.

(117) Reciprocal resultatives
a. Troilus and Cressida kissed *(each other) into a trance-like state.
b. The champions wrestled *(each other) motionless.
c. Othello and Desdemona hugged *(each other) black and blue.

(118) Reflexive resultatives
a. Once a week the mechanic washed *(himself) completely clean.
b. The men shaved *(their faces) smooth for the party.
c. The surfers showered *(themselves) clean after a day at the beach.

The entries for transitive *wash*, (115a), and implicit reflexive *wash*, (116a), are in (119) and (120), with one AS argument in the reflexive variant.[36]

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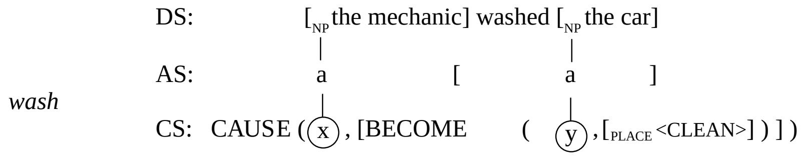
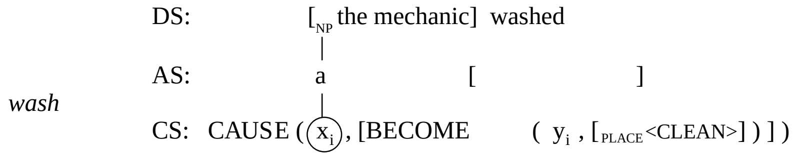
[36] Whether to represent (119) and (120) in one lexical entry or two is not critical for our point. We assume either way that the two versions are related by a lexical rule. But like the implicit

(119) Implicit Reflexive Object Formation Input


DS: [NP the mechanic] washed [NP the car]
AS: a [a]
wash
CS: CAUSE (x, [BECOME (y, [PLACE <CLEAN>])])

(120) Implicit Reflexive Object Formation Output


DS: [NP the mechanic] washed
AS: a [ ]
wash
CS: CAUSE (xi, [BECOME (yi , [PLACE <CLEAN>])])

Both verbs have as part of their meaning ‘x causes y to come to be in a new state’ (crudely represented as CLEAN.) As for all verbs, each constituent that links is designated. For the transitive verb in (119), the higher, less embedded agent, x, links to the external AS argument position and the more deeply embedded theme, y, links to an internal AS position in accordance with the ILH. The ILH is also obeyed for the implicit reflexive intransitive version, (120): y does not link and x links externally, since it is higher than the other (non-linking) terminals. It is the unlinked y in the CS of these verbs that provides the implicit theme interpretations, identified with x via coindexing, in accordance with the Bound Argument Condition.[37]

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indefinite object (*drink*) verbs in Section 1 of this chapter, some of these verbs provide evidence for a 2-entry approach. While transitive *shave* can take various object NPs, (i), for many speakers, implicit reflexive *shave* in (ii) can only mean (ia), which suggests that the requirements on the implicit object are tighter than on the object that links:

(i) a. Professional bicycle racers shave their faces.
b. Professional bicycle racers shave their legs/arms.
(ii) Professional bicycle racers shave.

[37] Though in English the rule deriving these verbs appears to delink the lower of the two coindexed arguments, making the outputs parallel to underived verbs with two coindexed CS arguments, (e.g., *buy* and *sell*), we leave open the possibility that reflexive/reciprocal rules in other languages delink the higher of the two coindexed CS arguments, leaving the lower one linked. This would mean a different version of the Bound Argument Condition for those languages. We have just seen lexical rules that delink the higher of two CS arguments (e.g., Passive Formation, Middle Formation, etc.) and this may be the case for Romance reflexives, which have the markings of unaccusativity. In French they take the auxiliary *être* typically used with unaccusatives:

(i) Troilus et Cressida se *sont* embrassés.
Troilus and Cressida reflexive AUX kissed.

And in Spanish they take *se*, which has also been argued to mark unaccusative verbs.

(ii) Troilus y Cressida *se* besaron.
Troilus and Cressida reflexive kissed.

The reciprocals in (117) (e.g., *kiss*) are identical to reflexives, except that their subjects must be plural.[38]

Implicit reflexive and reciprocal verbs are similar to the implicit theme verbs discussed in Section 2, above, but they have different interpretations because of their coindexing. In (116a), the mechanic washed **himself**, not some unspecified person or thing, sometimes referred to as an "indefinite object" interpretation. However, as we would predict, some sentences containing these verbs have both readings available, depending on context. Verbs with singular subjects can have a reflexive or an indefinite object reading on their implicit theme:

(121) a. Bill didn't shave on the camping trip. (= shave himself)
This barber shaves on Tuesdays and cuts hair on Fridays. (= shaves people)

b. Bill smells as though he hasn't washed in a week. (= washed himself)
You wash and I'll dry. (= wash something, probably dishes)

Verbs with plural subjects can have either a reciprocal or an indefinite object interpretation. Though (122) favors the reciprocal reading, the subjects could have fought or debated other people.

(122) a. David and Goliath fought in the Valley of Elah. (= each other or other people)
b. Chomsky and Piaget debated all over the country. (= each other or other people)

In sum, two different lexical word-formation rules operate on transitive verb inputs: one derives implicit reciprocal verbs and one derives implicit reflexive verbs. Both bind an agent to a more deeply embedded THING.[39] Since only one of the

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In fact, Pesetsky notes that under the Marantz-Kayne analysis of romance reflexive clitics (Pesetsky, 1995:117–118) the clitic is the external argument, and the lower full NP, the internal argument, moves in the syntax. As such, the Bound Argument Condition may be thought of as a generalization open to parametric differences. (See note 32, above.)

[38] Though we will not make one here, a further refinement in CS is needed to distinguish reciprocal from reflexive binding, to distinguish *they kissed* (= each other) from *they washed* (= themselves).

[39] Carrier-Duncan (1985) observed that the implicit argument is not always a verbal object but can be a prepositional object.

(i) [x and y] talked = x talked *with* y (not x talked y)
(ii) [x and y] collided = x collided *with* y (not x collided y)
(iii) x introduced [y and z] = x introduced y *to* z
(iv) x joined [y and z] = x joined y *to* z

Further, in (iii) and (iv), it is the object not the subject that receives the plural reciprocal interpretation. And the thematic roles of the bound elements are not always agent and theme. Such cases suggest that the rule specifying the binding cannot refer to invariant syntactic positions (e.g., "bind the internal argument to the external argument") or to thematic roles (e.g., "bind the theme to the agent"). Rather, Carrier-Duncan suggests that it must be stated in terms of the hierarchical structure two coindexed constituents links, the result in both cases is an AS-CS mismatch, the number of CS arguments exceeding the number of arguments in AS. But the outputs obey the ILH, since the CS geometry is reflected in AS.

4.5 Maintaining the Argument/Adjunct Distinction in Light of Selected Adjuncts

We have seen several classes of verbs whose CS arguments are not expressed as syntactic arguments of the verb. Instead, this unexpressed portion of the verb's CS (if not coindexed) can be fused with the CS of an XP by an adjunct rule, provided the XP satisfies any selectional restrictions imposed by the verb. Since selection is traditionally understood to be a property of arguments and not adjuncts, we must make our definitions of "argument" and "adjunct" explicit. Once we do, we will be able to show that the traditional distinction between arguments and adjuncts can – and should – be maintained.[40]

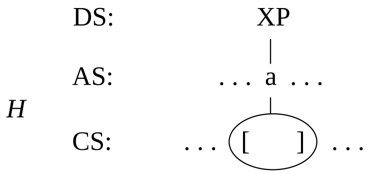
4.5.1 Syntactic Arguments

We define syntactic argument as follows:

(123) **Syntactic argument**
An argument of a head, H, is an XP that satisfies a position in the AS of H.

This corresponds to the picture in (124).

(124)



AS is a projection of all CS constituents designated to link as arguments in the syntax. The Theta Criterion in (125) (introduced in Chapter 1 (26)), as a relation between the CS thematic roles that link (i.e., the AS arguments) and XPs at D-Structure, then each *a* in the AS of a head will correspond to one (and only one)

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of CS: bind the most embedded CS constituent to the next most embedded constituent. Another rule that may refer to such hierarchical binding is the English suffix *-ee*.

[40] This distinction is discussed by many investigators. See, for example, Dowty (2001), MacFarland (1995), and Pylkkännen (2002).

XP at D-Structure. So an argument of *a* head, H, is an XP associated with an *a* in H's AS, which is linked to a constituent in H's CS.[41]

(125) **Theta Criterion**
Within the argument structure of a predicate,
a. each argument **must** thematically license one and only one syntactic constituent and
b. a syntactic constituent may saturate one and only one argument.

And conversely, any constituent in a head H's CS that corresponds to an obligatory syntactic XP will be designated as linking and will correspond to an argument in H's AS. From this it follows that **all obligatory syntactic complements are arguments**.[42] Moreover, since each XP argument of H corresponds to (and fuses with) a position in H's CS, it is s-selected by H. As such, the meaning of each XP argument is inextricably mingled with the meaning of the verb.

Note that our version of the Theta Criterion in (125) is stronger than others, for example, Samek-Lodovici's (2003), in (126) (emphasis, ours), in its use of *must* in clause (a) rather than *may*.

(126) **Theta Criterion** (Samek-Lodovici, 2003)
Within the argument structure of a predicate,
a. an argument **may** thematically license one and only one syntactic constituent and
b. a syntactic constituent may saturate one and only one argument.

We impose this stronger requirement because the Theta Criterion is stated as a constraint on the relation between just those thematic roles that are syntactically expressed as **arguments** of a head (and therefore appear in that head's AS) and the syntax. The Theta Criterion has nothing to say about implicit thematic roles that are not expressed as arguments, including those expressed by adjuncts. Thus it is not the Theta Criterion that prevents one theta role from corresponding to two syntactic XPs, one an argument and one an adjunct, but the PADF, repeated in (127), which is independently needed for verbs like *buy* and *sell* and will be needed for other verbs where the Theta Criterion is not involved.

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[41] As mentioned in Chapter 1 where this Theta Criterion was introduced, such a "relativized" Theta Criterion goes back to Schein (1982) and Emonds (1985). This version is adapted from Samek-Lodovici (2003). All of these formulations are "relativized" in that they apply "relatively", to each predicate, unlike the earlier formulation of Chomsky (1986):

(i) **Theta Criterion** (from Chomsky, 1986:184)
a. Each argument is assigned its theta role in exactly one theta position (namely, at D-structure)
b. Each assignable theta role must be assigned to an argument

[42] In fact, since we are choosing to express argument optionality with separate lexical entries (one with the argument, the other, without it) "optional arguments", when they appear in an entry, will be treated identically with obligatory arguments.

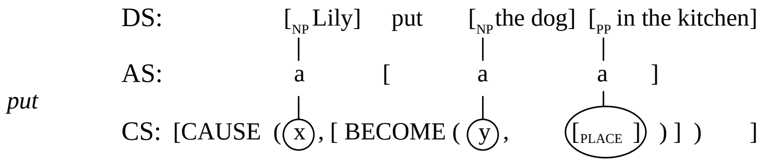
(127) **Prohibition Against Double Fusion**
Each constituent in CS can be fused with only once.

Consider a PP such as [*in the kitchen*]. For verbs like *put* and *reside* in (128), which require a location PP, [*in the kitchen*] is an argument:

(128) **Argument PPs**
a. Lily put the dog *in the kitchen*.
b. Lily resides *in the kitchen*.

It fuses with the PLACE constituent in the verb's CS, as shown in (129):

(129)

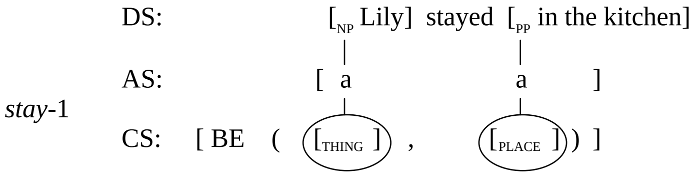

DS: [NP Lily] put [NP the dog] [PP in the kitchen]
AS: a [a a]
put
CS: [CAUSE (x, [BECOME (y, [PLACE])])]

Notice that while our definition of argument says that all obligatory syntactic elements are arguments,[43] it does not say the reverse. **Arguments can be optional.** This is the case for the same PPs when they occur with verbs like *stay* and *deliver*:

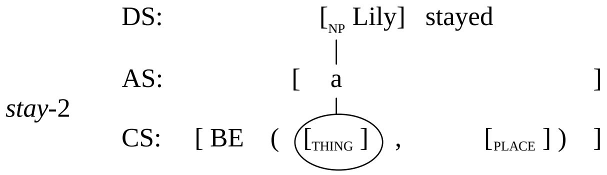
(130) a. Lily stayed (*in the kitchen*).
b. This company delivers newspapers (*to rural customers*).

Optionality is expressed in CS. Since all linking arguments must be expressed, optionality can be easily represented, as we have advocated doing, using two lexical entries, one in which the argument links, one in which it does not, as in these two skeletal entries for *stay*:

(131)


DS: [NP Lily] stayed [PP in the kitchen]
AS: [a a]
stay-1
CS: [BE ([THING] , [PLACE])]

(132)



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[43] We are, of course, omitting obligatory expletive elements such as pleonastic 'it' or 'there' (*It rained.*).

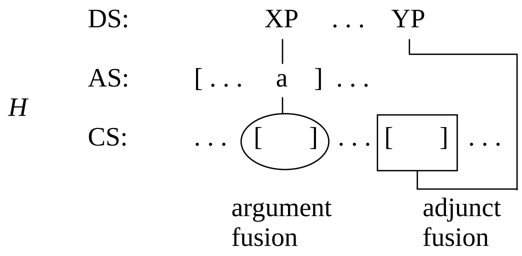
When the optional argument appears, like an obligatory argument, it is listed in AS and fuses with a portion of the verb's CS. But when it is absent, there is no corresponding XP and there is an unlinked CS constituent implicit in the meaning of the verb.

It is important to point out that the decision to encode optionality using two entries is not a simple matter of notation. In Section 1 of this chapter, in our discussion of *cook*, we showed that it is also possible to express optionality with a single entry using parentheses in AS. The optional CS argument links to an AS constituent, but that AS constituent is parenthesized. However, we prefer expressing optionality in CS, indicating that a CS constituent can link as a syntactic argument – or not – by the presence or absence of a linking circle. We do this for two reasons. First, AS is simply a projection of CS information interacting with our linking principle, not an independent level where information is inserted. So if an argument is optional it should not be encoded there. Its optional status derives from its status at CS. Second, CS arguments that are not expressed can be acted upon by adjunct rules, also at CS. So a verb with two CS entries can have an adjunct rule operate on one and not the other. It is not clear how this would work for a verb with one CS and a parenthesized argument in its single AS.

4.5.2 Adjuncts

Turning now to adjuncts, there are two types. **Fusing adjuncts**, such as YP in (133), do not correspond to an argument position in the AS of a head, as XP does. Rather, they bypass AS, fusing directly with a constituent in CS, through the operation of an adjunct rule.

(133) **Argument Fusion and Adjunct Fusion**



A fusing adjunct, like an argument, is s-selected, obeying any selectional restrictions that appear on the CS constituent it is fusing with. In (134), the locative *in*-PP fuses with the PLACE position in *bag*'s CS. That it is selected is clear; the object of *in* must qualify as some sort of bag:

(134) Sam bagged the groceries [*in brown paper bags*]/[*in wooden crates]

The second type, non-fusing, **peripheral adjuncts**, do not fuse with a CS constituent. Instrumental *with*-phrases, time adverbials, and other locatives, for example, are peripherally "tacked on" and do not correspond to an implicit piece of the verb's meaning.

(135) a. Sam bags groceries [in the check-out line].
Lily wrote abstracts [in the kitchen].

b. Sue buttered her crumpets [with a Swiss Army knife].
Lily wrote abstracts [with a green highlighter].

These peripheral adjunct PPs are like fusing adjuncts in that they are optional and are not identified with an AS position. But they are unlike fusing adjuncts, in that their CSs do not correspond to anything in the verb's meaning. In (135a) *in the check-out line* is not a sort of bag and does not fuse with the PLACE position in *bag*'s CS. And the CS of *write* has no PLACE with which *in the kitchen* could fuse. Like the instrumental PPs in (135b), these "tacked on" location PPs modify the entire event. When such CSs are integrated into sentences, they are mediated by a general adjunct rule, constrained only by pragmatic compatibility.

4.5.3 Tests for the Argument/Adjunct Distinction

The claim that there are (a) obligatory arguments, (b) optional arguments, (c) fusing adjuncts and (d) peripheral adjuncts leads to the question of how to distinguish them. Beginning with the argument/adjunct distinction, all of the standard tests hold.

First, arguments, whether obligatory or optional, can be replaced by *do so*, which replaces a verb and all of its arguments but can leave adjuncts behind. The optional arguments of *stay* and *deliver* act like the obligatory location argument of *put* in (136a), and unlike the peripheral adjuncts in (136b).

(136) a. *Whenever company comes, John puts the dog [in the basement], and Lily does so [in the kitchen]
*Fred stayed [in the bedroom] and Lily did so [in the kitchen].
*This company delivers newspapers [to rural customers] and that company does so [to urban ones].

b. Fred stayed in the kitchen [all day] and Lily did so [all night].
This company delivers newspapers to rural customers [by truck] and that company does so [by bike].

In contrast, the fusing selected adjuncts for *bag* and *butter* in (137a) behave like the peripheral adjuncts in (137b), parallel to the peripheral locative and instrumental adjuncts on *write* in (137c). They all can be left behind by *do so* replacement, so they are all adjuncts.

(137) a. This cashier bags groceries [in plastic bags] while that one does so [in paper bags].
Sue butters her crumpets [with margarine] and Pam does so [with butter].

b. Rob bags groceries [in the warehouse] and Sam does so [in the check out line].
Pam butters her crumpets [with the back of a spoon] and Sue does so [with a Swiss Army knife].

c. Fred wrote abstracts [in the bedroom] and Lily did so [in the kitchen].
Fred wrote abstracts [with a green highlighter] and Lily did so [with a pink pen].

Second, all arguments, even optional ones like the PPs with *stay* and *deliver*, resist being separated from their verb by an adjunct (such as *yesterday or last year*), as shown in (138a), unlike other peripheral adjuncts, as in (138b):

(138) a. *Lily put the dog [yesterday] [in the kitchen].
*Lily stayed [yesterday] [in the kitchen]
*This company delivered newspapers [last year] [to rural customers].

b. Lily put the dog in the kitchen [yesterday] [for a few hours].
Lily stayed (in the kitchen) [yesterday] [for a few hours].
This company delivered newspapers (to rural customers) [last year] [by bicycle].

Adjuncts, in contrast, whether fusing adjuncts as in (139a) or peripheral adjuncts, (139b), can be separated from their head by another adjunct.

(139) a. This cashier bagged groceries [yesterday] [in plastic bags].
Sue buttered her crumpet [yesterday] [with margarine].

b. This cashier bagged groceries [yesterday] [in the check-out line].
Sue buttered her crumpet [yesterday] [with a Swiss Army knife].

However, the two types of adjuncts can be distinguished by constituent order. When both types occur, selected adjuncts (in italics) must precede peripheral adjuncts:

(140) a. Sam bagged groceries [*in brown paper bags*] [in the check-out line].
Sue buttered her crumpet [*with margarine*] [with a Swiss Army knife].

b. *Sam bagged groceries [in the check-out line] [*in brown paper bags*].
*Sue buttered her crumpets [with a Swiss Army knife] [*with margarine*].

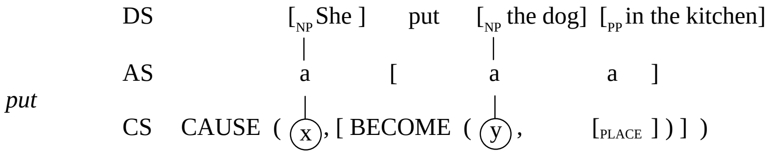
And they are also distinguished by meaning. Since fusing adjuncts, like arguments, fuse with the CS of a verb, speakers have the intuition that these types of PPs fill in something implicit in the verb's meaning. The fusing *with*-theme PP adjunct for *butter*, [*with margarine*], fills in something about that verb's implicit theme. The fusing adjunct PP for *bag*, [*in brown paper bags*], specifies its implicit location. For a non-fusing adjunct like *bag*'s [*in the check-out line*], there is no implicit element in the verb's CS being filled in. It is simply tacking on extra information.

4.5.4 Additional Justifications for the Argument/Adjunct Distinction

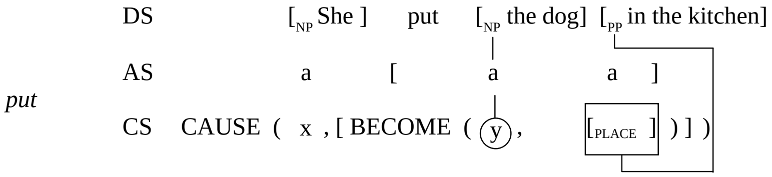
While our take on adjuncts follows Jackendoff's – that some adjuncts, like arguments, fuse with positions in the CS of a verb – **we maintain a clear distinction between arguments and adjuncts**, a distinction that he abandons. He claims, for example, that the fusion of the CS of the optional PP-argument of *stay* in (130) could be effected by the same PP-Adjunct Rule that applies to *in brown paper bags* in (134). The argument PP would then not correspond to a position in the verb's AS. Its CS would fuse directly with PLACE in the CS of *stay*, just as the CS of *in brown paper bags* fuses with PLACE in the CS of *bag*. The lexical entry for *stay* in (132) without a PP would be sufficient to handle *stay* with a locative PP as well. For Jackendoff the optional PP with *stay* is not an optional argument of the verb, but an adjunct.

Jackendoff goes further, applying this same reasoning to **obligatory** argument XPs such as the XP expressing PLACE for *put*, which he claims could be handled with the same PP-Adjunct Rule that fuses the locative adjunct for *bag*. Jackendoff's lexical entry for *put* (translated into our notation) would look like (140a).

(141) a.



b.



Two obligatory internal AS positions correspond to NP and PP, but the second *a* would not be linked to a CS constituent, and the PP it corresponds to would not be an argument of the verb. *In the kitchen*, which "satisfies" the second AS position, would fuse with PLACE in the CS, but with no mediation by the AS of *put*, as shown in (141b). Because this fusion (though obligatory) is carried out via the PP-Adjunct Rule, the PP is, in Jackendoff's terms, an "obligatory adjunct", not an argument of *put*. As he puts it (discussing *rid*, which requires an *of*-theme: *rid the room of insects*),

> . . . if correct, this solution in terms of an 'obligatory adjunct' severely blurs the distinction between 'syntactic arguments' and 'adjuncts'. If a 'syntactic argument' is supposed to be a phrase whose theta-role is specified by the verb, and an adjunct is supposed to be an optional phrase not specified by the verb, the *of*-phrase with *rid* falls in the cracks: it is syntactically required by the verb but received its theta-role by a non-lexical principle. I personally have no problem with accepting such a result. The argument-adjunct distinction, while it has been useful as a rough-and-ready criterion, has on the whole simply been assumed . . . Jackendoff (1990:176)

Given this perspective, two issues arise. First, the question of optional arguments. For Jackendoff, a verb like *stay* (which for us, has an optional argument) is strictly intransitive. When its locative PP occurs, it has the same adjunct status as the PPs for *bag* and *butter*. It is unclear how he would explain why, when the PPs are missing, *stay* sounds elliptical but the other verbs do not:

(142) a. Lily stayed.
b. She bagged the produce.
c. She buttered her crumpet.

Nor is it clear how he would explain the argument/adjunct differences revealed by the established diagnostics, like the *do so* contrast between *stay* and *bag*:

(143) a. *Fred stayed in the bedroom and Lily did so [*in the kitchen*].
b. This cashier prefers to bag groceries [*in plastic bags*] while that one prefers to do so [*in paper bags*].

Abandoning the argument-adjunct distinction simply seems to require giving up an explanation for these classic contrasts.

Second, if Jackendoff's goal is to remove as many regularities as possible from the linking rules and encode them instead in adjunct rules, he could go much further. Adjunct rules could handle any XP that fuses with PLACE in any change-of-location or change-of-state verb. Even many direct objects could be treated as adjuncts. Given that so many direct objects correspond to theme, he could write a Direct Object Theme Adjunct Rule to fuse the CS of the postverbal NP directly with the theme in the CS of the verb. A Subject Agent Adjunct Rule could fuse the CS of the subject NP with the agent in the CS of a causative verb. Only for the small number of verbs whose CSs could not be covered by new adjunct rules (e.g., psych verbs) would fusion still have to operate via a lexically specified AS. But to the extent that he could reformulate linking regularities as adjunct rules, syntactic structure could plug into CS directly, and obviate the need for any linking rules that relate CSs of lexical entries to the syntax.

We take the opposite position: adjunct fusion rules are just that. They fuse adjuncts – not arguments – with portions of a verb's CS, provided the adjuncts meet the selectional requirements of the verb. That some adjuncts have the same syntactic structure as some arguments might be seen as missing a generalization, but to handle them with the same rule would miss the classic distinction between arguments and adjuncts that needs to be explained.

To conclude, we are retaining the argument/adjunct distinction, but we must give up one of the standard diagnostics of argument status. Since when adjuncts fuse with implicit argument positions in CSs (as *with*-PPs do with the theme of *butter*), they meet the selectional restrictions of the verb, selection cannot be taken as a reliable indicator of argumenthood. Adjuncts, too, can be selected.

Chapter 5

The Linking of Resultative Verbs: Clausal Fusion

The last chapter explored how the CSs of many classes of verbs and deverbal forms are handled by our linking theory, the Isomorphic Linking Hypothesis (ILH). This chapter will focus on a class of verbs that appear to challenge the ILH, resultative verbs like (1).

(1) a. The joggers ran their Nikes threadbare.
    b. The gardener watered the tulips flat.

Resultative verbs, like passive and middle verbs, are the result of a lexical process, Resultative Formation (RF). And like the lexical rules associated with passives and middles, RF captures the alternation between pairs of lexical entries, relating the entry for a resultative verb like *run* or *water* in (1) to the entry for its non-resultative counterpart in (2).[1]

(2) a. The joggers ran.
    b. The gardener watered the tulips.

RF is similar to these other rules in another way. As the resultatives in (3) show, RF coins new resultative verbs very productively.

(3) a. In her efforts to contact all 2,000 participants, she *faxed* herself into a frenzy.
    b. The thousands of skating enthusiasts who come here every week have *roller-bladed* the pavement thin.

RF, like all word-formation rules,[2] specifies the meaning of its outputs as a function of the meaning of its bases (Aronoff, 1976). Thus the meanings of the resultatives in (1) are closely related to the meanings of the non-resultatives in (2). Roughly speaking (to be refined below), (1a) means, 'the joggers' running caused their Nikes to become threadbare'. *Run* is intransitive; the joggers ran, they did not run their Nikes.

---

[1] Resultative Formation, functioning also as a traditional lexical "redundancy rule", eliminates the cost of the newly created lexical entries.

[2] By "word-formation", we are not referring to a derivation involving syntactic movement to a position inside a functional projection. This lexical formation process has no necessary link to any such derivations.

J. Randall, *Linking: The Geometry of Argument Structure*, 137–172

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In contrast, (1b) means ‘the gardener’s watering the tulips caused them to become flat’. *Water* is transitive; the gardener watered the tulips. As we will see below, the difference between these cases is derived from the difference in the base verbs in (3): *run* is intransitive and *water* is transitive. The relation in meaning between the resultative and its base verb comes from how RF operates, inheriting the CS of the base verb to create the CS of the resultative verb, as shown in (4).

(4)

CS of base verb: [...]

↓ Resultative Formation (RF)

CS of resultative verb: $[\ldots\ \underbrace{[\ \ldots\ ]}_{\text{CS inherited from base verb}}\ \ldots]$

We assume that the two verbs are represented in two different lexical entries, in keeping with our multi-entry approach to the lexicon.

In the course of this chapter, we will fill in the rule in (4) by determining what CS function and arguments RF adds to the CS inherited from the base verb. In laying out how resultative CSs link to the syntax, we will identify a new type of CS-AS mismatch, which will lead us to refine our notions about fusion and will have implications for the argument structures of many other classes of verbs, which we will explore in the next chapter. These revisions, in turn, will lead to a more elegant and explanatory theory.

Before proceeding, we want to comment on our claim that the relationship between a resultative and a non-resultative should be handled lexically. This claim builds on our earlier analysis of resultative verbs as lexical items distinct from their base verbs, having one additional argument, the result XP (Carrier & Randall, 1992, 1993). Since syntactic arguments are projected from the lexicon, this argument could **only** be added by a lexical rule. Our approach contrasts with that of Jackendoff (1990) and others who claim that a resultative is simply a non-resultative verb with a result XP adjunct (see, for example, the template augmentation rules of Rappaport and Levin (1998a). We will turn to Jackendoff’s analysis later in this chapter. Before that, in Section 1, we will fill in the missing CSs in (4). In Section 2, we will propose the argument structures of the basic types of resultatives. In Sections 3 and 4, we turn to how these facts can be accounted for by our linking theory.

5.1 The Conceptual Structure of Resultative Verbs

The meaning shared by all resultatives – regardless of transitivity – contains a common core, paraphrased in (5).

(5) The action of the base verb is performed ‘to such an extent’ that it causes the postverbal NP to go into the resultant state designated by the XP.

(6a), for example, means ‘the joggers’ running to such an extent caused their Nikes to come to be in a threadbare state.’ (6b) means ‘the gardener’s watering the tulips to such an extent caused them to come to be in a flat state.’

(6) a. The joggers ran their Nikes threadbare.
b. The gardener watered the tulips flat.

In Chapter 4, we distinguished true resultatives, (7), from “pseudoresultatives”, (8), which do not have what we will call “extent” readings. (8a) does **not** mean, ‘she broke the stick **to such an extent** that it went into six more or less equal pieces’

(7) Resultatives

a. She *whacked* the stick *into six more or less equal pieces*.
b. The gardener’s helper *watered* the tulips as flat as pancakes.
c. The chef *whisked* the butter to a fine liquid.
d. The joggers *ran* their feet black and blue.
e. She *wiggled* the door open.

(8) Pseudoresultatives

a. She *broke* the stick *into six more or less equal pieces*.
b. The gardener’s helper *flattened* the tulips *as flat as pancakes*.
c. The chef *melted* the butter *to a fine liquid*.
d. The actors *dyed* their feet *black and blue*.
e. She *opened* the door *wide open*.

In addition to the cases in (7) and (8), which all involve states, there are “location” resultatives and “location” pseudoresultatives:

(9) Resultatives (location)

a. Noa wiggled the tooth *out of her mouth*.
b. Last night, the soprano sang all of her neighbors *out of their beds*.
c. The sonic boom blasted the dolphins *out of their usual feeding area*.
d. The bears frightened the campers *into their tents*.

(10) Pseudoresultatives (location)

a. Noa got/took/forced the tooth *out of her mouth*.
b. The soprano welcomed all of her neighbors *into her home*.
c. The sharks chased the dolphins *out of their usual feeding area*.
d. The counselors coaxed the campers *into their tents*.

These differ in meaning in the same way as (7) and (8) do. (9b) requires that the soprano sing to an extent sufficient to achieve the result; in (10b) there is no “extent” requirement on *welcome*.

There are three ways to satisfy the “extent” requirement in the meaning of a resultative verb and which one is satisfied depends on the type of verb involved: (1) the activity denoted by the verb can happen with sufficient force to bring about the result, as in (7a,b) and (9c,d) and perhaps (9b), (2) the activity can last for a sufficient duration (7c,d,e) and (9a) and again, perhaps (9b), or (3) the activity can iterate, as in (7a), with the reading that a series of not very forceful whacks achieved the result. We will not explore the extent interpretation in more detail here; for the purposes of this chapter, we will simply assume it and represent it in resultative CSs with a superscript e, for extent.[3]

A subpart of the core of meaning of resultatives in (5), namely ‘cause NP to go into state XP,’ is shared by non-derived causative change-of-state verbs *render* and *make*. In fact, (6a) and (6b) entail the sentences with *render* or *make* in (11):

(11) a. Something rendered/made their Nikes threadbare.
b. Something rendered/made the tulips flat.

As such, the CS for *render* in (12) provides a skeleton for the CS of resultatives, which can be paraphrased as ‘w causes [x to go into a state]’.

(12) CS of *render*: $[\text{CAUSE}\ \ (w\ ,\ \underbrace{[\text{BECOME}\ \ (\ x\ ,\ \ [_{\text{PLACE-a}}\ \text{AT}\ \ldots\ \ ]\ )\ ]}_{\text{result clause}}\ \ )\ ]$

But resultative CSs differ from the CS of *render* in three crucial respects. First, whereas for *render* the first argument of CAUSE, w, (the “agent”) can be a THING, as shown in (13), for resultative verbs, it is always a CS clause inherited from the base verb, an EVENT.

(13) a. In the 1980’s, *the computer* rendered/made the typewriter obsolete.
b. By repeatedly running on gravel, *the joggers* rendered/made these Nikes unusable.
c. By watering them too forcefully, *the gardener* rendered/made these tulips unusable (for the floral arrangement).

So for *run* in (6a), though the subject of the resultative sentence is *the joggers*, it is actually the joggers’ running, not the joggers, that brings about the change in the state of the Nikes. The CS for resultative *run*, then, uses a skeletal CS identical in all crucial respects to the CS of *render*, except that the first argument of CAUSE is the entire CS of the base verb, intransitive *run*.[4]

---

[3] We will explore the extent interpretation further in future work.

[4] Of course, *make* and *render* can also take an entire CS clause as the first argument of CAUSE, which gives them CSs similar to the resultative CSs in (1). But this is possible only if their subject NP is headed by a word whose CS is a clause, for example, a gerund.

(i) *The joggers’ running in too many marathons* has made their Nikes threadbare.
(ii) *The gardener’s watering the tulips too often* has made them flat.
(iii) *The joggers’ incessant running* has rendered their Nikes unusable.
(iv) *The gardener’s watering the tulips too forcefully* rendered them unfit for floral arrangements.

Second, whereas in the CS for *render* the PLACE is abstract, in the CS for a resultative, it is unspecified. Result XPs typically designate states (e.g., *flat*, *threadbare*), but they can also designate concrete locations.

(14) a. The audience booed the actor *out of the theatre*.
  b. The dentist wiggled the tooth *out of its socket*.

We will usually refer to the result in a resultative as a resultant "state" because they are more common. But in our resultative CSs, we will leave PLACE unlabelled.

Third, *make* and *render* lack the "extent" interpretation that resultatives require. In the paraphrase of (11), the "something" does not need to happen to a particular extent.

In (15) is the full CS for resultative *run*. Upper-case RUN stands for the meaning of "run". (We are temporarily omitting linking, but we will reintroduce it in the next section.) (15) can be paraphrased as '[w's running (to such an extent)] caused [y to come to be in a state]'. As mentioned above, the superscript "e" indicates, informally, 'to such an extent'.[5]

(15) CS of resultative *run*

$$[\,\text{CAUSE}\ \ (\ \underbrace{[\,\text{RUN}\ (\,w\,)\,]^{e}}_{\substack{\text{1st argument of CAUSE}\\ =\ \text{CS inherited from } \textit{run}}}\ \ ,\ \ \underbrace{[\,\text{BECOME}\ \ (\,y\ ,\ [_{\text{PLACE}}\ \text{AT} \ldots\ ]\,)])}_{\substack{\text{2nd argument of CAUSE}\\ =\ \text{result clause}}}\ ]$$

For transitive resultatives, the first argument of CAUSE is also complex. In (6b), it is [the gardener's watering the tulips (to such an extent)], not simply [the gardener], that causes the tulips to become flat. We depict this in (16), where the CS inherited from basic *water* is embedded in the first argument of the highest CAUSE of the resultative.[6]

In contrast, a resultative subject NP cannot be headed by a gerund:

(v) *The gardener's sprinkling the tulips watered them flat.

So although the resultatives in (6) and the sentences in (i)–(iv) have similar CSs, they differ in whether this CS is supplied by the verb's lexical entry (for resultatives) or is built up through the fusion of a verb's CS with the CSs of its arguments.

[5] This meaning, minus the "extent", is essentially the meaning attributed to resultatives by Dowty (1979).

[6] We are assuming here, following Jackendoff (1990:164), that basic, nonresultative *water* is a causative change-of-location verb meaning 'w causes water to go on x'. Its theme, <WATER> is implicit and its goal, x, is expressed in the postverbal NP, *the tulips*. However, as we discussed for *butter* in Chapter 4, this may not be correct. Putting water on their leaves and petals does not constitute watering the tulips. In fact, it is possible to water plants via subterranean hoses with no water going **on** them at all. So *water* might instead mean something like 'cause to ingest water'. Since we have no evidence either way and since the present discussion does not hinge on it, we will stick to the representation in (16). What is clear is that the CS for non-resultative *water* – whatever that CS turns out to be – is inherited into the CS of the resultative verb.

(16) CS of resultative *water*

$$[\text{CAUSE}\ (\ \underbrace{[\text{CAUSE}\ (w\ ,\ [\text{BECOME}\ (\ [\langle\text{WATER}\rangle],\ [_{\text{PLACE}}\ \text{AT}\ x]\ )]}_{\text{CS inherited from base verb } \textit{water}}{}^{e},\ \underbrace{[\text{BECOME}\ (y,\ [_{\text{PLACE}}\ \text{AT}\ \ldots]\ )]}_{\text{result clause}}\ )\ ]$$

So for both transitive and intransitive resultatives, it is an activity, not a thing, that brings about the resultant state.

As evidence that the base verb's CS is inherited into the CS of the resultative verb, notice that the same theta role assignments and selectional restrictions apply to the base and resultative verbs. The selectional restrictions on the objects of obligatorily transitive *frighten*, *crane*, and *hypnotize* that distinguish (a) from (b) in (17)–(19) are the same ones that distinguish the resultatives (c) from (d). (These examples are from Carrier & Randall, 1992).

(17) a. The bears frightened the hikers.
b. *The bears frightened the campground.
c. The bears frightened the hikers speechless.
d. *The bears frightened the campground empty.

(18) a. The tourists craned their necks.
b. *The tourists craned their children's necks.
c. The tourists craned their necks sore.
d. *The tourists craned their children's necks sore.

(19) a. The magician hypnotized the volunteers.
b. *The magician hypnotized the auditorium.
c. The magician hypnotized the volunteers into a trance.
d. *The magician hypnotized the auditorium quiet.

For example, for *frighten*, it is the theme's selectional restriction <SENTIENT> that is inherited into the CS of the resultative, that allows *the hikers* in (17c) but blocks *the campground* in (17d), as shown in (20).

(20) $[\text{CAUSE}\ (w,\ [\text{BECOME}\ (\ [_{\text{THING}}\langle\text{SENTIENT}\rangle],\ [_{\text{PLACE-}}\ \langle\text{FEARFUL}\rangle]\ )]\ )]$

$$\downarrow$$

Resultative Formation

$$\downarrow$$

CAUSE

$$(\ \underbrace{[\text{CAUSE}\ (w,\ [\text{BECOME}\ (\ [_{\text{THING}}\langle\text{SENTIENT}\rangle],\ [_{\text{PLACE-}}\ \langle\text{FEARFUL}\rangle]\ )]\ )]}_{\text{CS inherited from base verb } \textit{frighten}}{}^{e},\ \underbrace{[\text{BECOME}\ (y,\ [_{\text{PLACE}}\ \text{AT}\ \ldots\ ])\ ]}_{\text{result clause}}\ )$$

Similarly, it is inheritance that explains the contrast between the grammatical resultatives in (6) (repeated here) and the ungrammatical resultatives in (21), which fail because they violate selectional restrictions on their subjects, the same ones that hold of their base verbs in (22).

(6) a. The joggers ran their Nikes threadbare.
b. The gardener watered the tulips flat.

(21) a. *This rough pavement will run our Nikes threadbare.
b. *The hose watered the tulips flat.

(22) a. *This rough pavement will run.
b. *The hose watered the tulips.

Finally, in the intransitive resultative (6a), *their Nikes* does not get a theta role from resultative *run* nor is it an argument of that verb. ((6a) does not entail that the joggers ran their Nikes.) This is also a direct consequence of inheritance (Randall, 1988). The base verb *run* takes one argument and has only one theta role to assign – an agent. So only an agent is passed on to the CS of resultative *run*.[7]

RF, then, has a uniform effect at the level of CS, regardless of whether the base verb it applies to is transitive or intransitive. As shown in (23), it creates a 2-place CAUSE predicate, embedding the base verb's CS as its first argument.[8] The second argument of this higher CAUSE is a change-of-state CS clause, headed by BECOME. In addition, it adds an "extent" interpretation to the inherited portion of the CS, as the superscript e indicates.[9]

---

[7] A reviewer asks why the inherited event is the first rather than the second argument of the newly introduced causative predicate. Could a rule, call it RF', do the reverse, as in (i)?

(i) $$\text{resultative CS: CAUSE } (\underbrace{[_{\text{EVENT}}\ \text{BECOME}\ (y\ ,\ [_{\text{PLACE}}\ \text{AT} \ldots])]^{e}}_{\text{result clause}}\ ,\ \underbrace{[_{\text{EVENT}}\ \ldots\ ]}_{\text{inherited CS}})$$

If so, *the gardener watered the tulips flat* would mean 'the tulips becoming flat (to a sufficient extent) caused the gardener to water the tulips'; *John worked himself poor* would mean 'John's becoming poor to a sufficient extent caused John to work'. In principle, we do not rule out a lexical process of this sort, however, the fact that these CSs parallel the CSs of *render* and *make* suggests a (perhaps language-specific) lexicalization pattern related to CAUSE predicates.

[8] The label EVENT on the inherited CS argument indicates that this first argument of CAUSE cannot be a THING as it can for *render*. Note that our meaning of "event" is broader than Vendler's (1967) and Dowty's (1979) "event", which refers to the last two categories of their four-way classification: states, activities, accomplishments and achievements. For us event also includes activities (but not states).

[9] A reviewer wonders how (23) avoids violating compositionality, a well-established principle of semantic interpretation, since it introduces semantic material that has no "source in any linguistic material". However, (23) is not a syntactic derivation. It is both a lexical "redundancy rule" that **relates** the entries of two verbs, and also a lexical formation process (ie., a word-formation rule) – that can add semantic material – as it **creates** new words from old. Other such lexical operations, for example, causativization rules take a verb and add a higher CAUSE predicate and an argument (and in some accounts, a zero-suffix.)

(i) The tent collapsed.
(ii) The boy scouts collapsed the tent.

Such lexical processes are compositional in the sense that the abstract CS elements that they use come from a universal inventory of lexical primitives, put together according to innate generative principles of combination. See Jackendoff (1990, Chapter 1) for discussion.

(23) **Resultative Formation**

CS of base verb: $[_{\text{EVENT}} \ldots]$

↓ Resultative Formation (RF)

CS of resultative verb: $[\text{CAUSE} \ (\underbrace{[_{\text{EVENT}} \ldots]^{e}}_{\text{inherited CS}} \ , \underbrace{[_{\text{EVENT}} \text{BECOME} \ ([_{\text{THING}} \ldots] \ , [_{\text{PLACE}} \ \text{AT} \ \ldots])]}_{\text{result clause}} \ )]$

Notice that RF does not say anything about the argument structure of resultative verbs, and it need not. The fact that transitive resultatives select and theta mark one more argument than intransitive resultative verbs follows from inheritance: they inherit one more CS argument from their base verbs. But the argument structure of resultatives is the subject of the next section. We turn to it now.

5.2 The Argument Structure of Resultative Verbs

In the last section we proposed a CS for resultative verbs and showed that RF has a uniform effect at the level of CS. The CS differences between transitive and intransitive resultatives are due to the CS differences between their base verbs. This is true for AS as well. In our early work on resultative verbs (Carrier & Randall, 1992), we established the one AS difference between a resultative verb and its nonresultative counterpart: the resultative verb has an additional internal "result argument", as shown in boldface in (47):

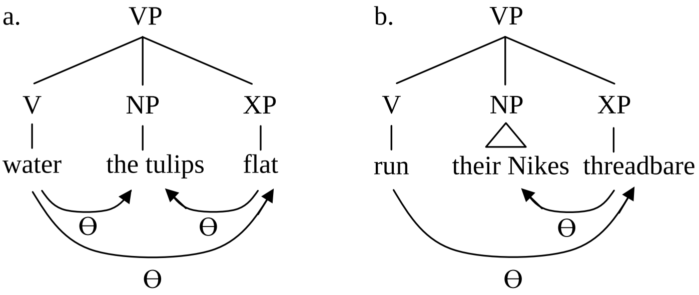
(24)

	AS of base verb		AS of resultative verb
transitive:	a [a]	→	a [a **a**]
unaccusative:	[a]	→	[a **a**]
unergative:		→	a [**a**]

Thus RF has a uniform effect on all ASs as well. The three types of resultatives have different ASs because the verbs they are derived from do.

Leaving unaccusatives aside for the moment, this means that for transitive resultatives, the verb theta marks three arguments, the agent, the theme and the result. For intransitive (unergative) resultatives, the verb theta marks two, the agent and the result. But for both types, as illustrated in (25), the postverbal NP is theta marked by the result predicate. This means that for transitive resultatives, in (25a), the postverbal NP is an argument of two predicates, the verb and the head of the XP.

(25)



Note that this situation is not a problem for the Theta Criterion (repeated in (26)), since the NP, though assigned two theta-roles in total, is assigned one and only theta-role by each predicate. We will return to this point in Chapter 6, Section 3.

(26) **Theta Criterion**
Within the argument structure of a predicate,
a. each argument must thematically license one and only one syntactic constituent and
b. a syntactic constituent may saturate one and only one argument.

Before exploring how resultatives can be accounted for under the ILH and what challenges they pose, it is important to review the evidence for the argument structures in (24). We turn to this now.

5.2.1 The Argumenthood of the Result XP

Several types of evidence (some from Carrier & Randall, 1992) show that the result XP is an argument of a resultative verb.

5.2.1.1 Selection

As discussed at the end of Chapter 4, selection and argumenthood are not the same thing. Selection does not imply argumenthood: a constituent can be selected but not be an argument. One example are adjuncts that fuse with the CS of their head. They must obey the selectional restrictions on the portion of CS that they fuse with, as we saw in Chapter 4: *The queen buttered her crumpet with margarine / ∗olive oil*. On the other hand, argumenthood does imply selection. If something is an argument, it must be selected. So if result XPs are arguments, we should find evidence that they are selected. And we do.

Result XPs are fairly free in terms of category – AP, PP and NP are all possible, as (27) shows – but they must be a PLACE, either abstract (a state) or concrete (a location).

(27) a. AP result phrases She pounded the dough [$_{AP}$ flat as a pancake].
She sunned herself [$_{AP}$ brown].
She wiggled her tooth [$_{AP}$ loose].
She ran her sneakers [$_{AP}$ ragged].

b. PP result phrases She pounded the dough [$_{PP}$ into a pancake].
The dentist wiggled the tooth [$_{PP}$ out of its socket].
She ran her sneakers [$_{PP}$ to tatters].
The audience booed the actor [$_{PP}$ off of the stage].

c. NP result phrases She sunned herself [$_{NP}$ a coppery shade of brown].
She ran her sneakers [$_{NP}$ a dingy grey color].

So the cases in (28), where the NPs designate THINGs, are out.

(28) *She pounded the dough [$_{NP}$ a pancake].
*She sunned herself [$_{NP}$ one big wrinkle].
*She ran her sneakers [$_{NP}$ a disgrace].

Another selection violation, this one aspectual, makes participle *-ed* and *-ing* APs impossible (Simpson, 1983a; Smith, 1983).[10]

(29) a. Transitive resultatives:
The maid scrubbed the pot [$_{AP}$ shiny / *shined / *shining].
The jockeys raced the horses [$_{AP}$ sweaty / thirsty / hungry / *sweating / *exhausted].
The chef cooked the food [$_{AP}$ black / *blackened / *charred].
The gardener watered the tulips [$_{AP}$ flat / soggy / *flattened / *wilting].

b. Intransitive resultatives:
The joggers ran themselves [$_{AP}$ sweaty / *sweating / *exhausted].
The kids laughed themselves [$_{AP}$ sick / *sickened].
The chef cooked the kitchen walls [$_{AP}$ black / *blackened].
The tourists walked their feet [$_{AP}$ sore / blistery / *blistered].

Note that the incompatibility is clearly between the XP and the verb. As (30) shows, there is no incompatibility between the result XP and the postverbal NP:

(30) the shined/shining pot
the sweating/exhausted horses
the flattened/wilting tulips
the sickened kids
the blackened kitchen walls
the blistered feet

---

[10] Evidence that the clash is aspectual comes from comparing these forms with adjectives that look deverbal but are not. Syllabic *-ed* adjectives (*ragged, three-legged, wicked*) are fine as are *-ing* adjectives that have drifted semantically (e.g. *Don Juan wined and dined his women willing*).

These same aspectual selectional restrictions apply to the non-resultative verbs with CSs parallel to resultatives, discussed above, where the XP, of whatever category, is clearly an argument:

(31) All this pounding has rendered/turned/gotten the dough {[$_{AP}$ grey/ dry / *dried / *drying].
[$_{NP}$ a dingy shade of grey / *a pancake].}

If these selectional restrictions are lexically specified by non-resultative verbs, then they must also be lexically specified by resultative verbs.

5.2.1.2 Lexicalized Selectional Restrictions

Further support that result XPs are arguments and not adjuncts comes from "resultative idioms". Those in (32) consist of a verb plus a particular result XP; others, like *drive* in (33), allow result XPs that fall within a semantic range, specifically any deranged mental state.[11] Now, it is well-known that idioms consist of heads and arguments. This shows without doubt that some result XPs (at least the ones in these idioms) **must** be arguments of these verbs.

(32) a. God smote him [dead / *half-dead / *black and blue].
b. She drove her car [into the ground].
c. She worked her fingers [to the bone].

(33) He drove her {[crazy / bonkers / over the edge / to the brink of lunacy].
[*happy / *to the brink of ecstasy].}

Besides idioms, there are "lexical" resultatives, which do not have non-resultative counterparts: *lull*, *wrest* and transitive *knock* all require a result XP.

(34) a. The muzak lulled the patients [to sleep / into a sublime state].
The knight wrested the sword [from the stone].
The boxer knocked his opponent [senseless].

b. *The muzak lulled the patients.
*The knight wrested the sword.
*The boxer knocked his opponent.

Since the result XP is obligatory, these cases show without a doubt that at least some result XPs are arguments.

A related fact supports treating these XPs as arguments rather than adjuncts. Suppose they were adjuncts, parallel to depictive XPs such as (35).

---

[11] Note that *drive* and *work* can also be used non-idiomatically with other result phrases:

(i) She drove her car [ragged].
(ii) She worked her fingers [sore/stiff/black and blue].

(35) a. Nick ate the meat raw.
b. Nick ate the meat nude.

Then we might expect to find, parallel to lexical [verb + result] combinations like (32) and (34), the same range of lexical [verb + depictive] combinations. But we do not. Strikingly, as far as we know, there are no verbs that idiosyncratically select either an idiomatic depictive XP or a semantically limited range of depictive XPs, and no verbs that **require** a depictive XP. This contrast between resultative and depictive XPs is expected under our assumption that only result XPs are arguments, which can therefore drift semantically.

5.2.1.3 Lexical Rules: Adjectival Passive Formation and Passive Compound Formation

Additional evidence for the argumenthood of result XPs comes from Adjectival Passive Formation (APF) and Passive Compound Formation (PCF). In Chapter 2, Section 2.3, we showed how adjectival passives are derived. After an active verb like *read* in (36a) undergoes Verbal Passive Formation (VPF), APF applies as in (36b), creating an adjective and externalizing an internal argument, *books*. *Children* in (36c) cannot be externalized because it is not an argument of *read*.

(36) a. We read books to the children.
b. the books were (un)read; the (un)read books
c. *the children were (un)read; *the (un)read children

When APF applies to resultative verbs, it externalizes the postverbal NP argument, simultaneously incorporating the result XP as the right-hand member of a compound adjective:

(37) Results incorporated in adjectival passives by APF

a. watered-flat tulips
b. spun-dry sheets
c. smashed-open safe
d. rubbed-smooth stones

It is the result XP's argument status that allows it to occur inside an adjectival passive. As (38) shows, APF cannot incorporate adjuncts. Depictive adjuncts, in (38a), form ungrammatical adjectival passives as do adverbial adjuncts, in (38b), and adjuncts formed from the nouns inside PPs, (38c). In (38c), the incorporated nouns come from various types of optional adjunct phrases, manner (*by force*/*hand*), location (*on trees*, *in a dryer*), instrument (*by machine*, *with a hose*/*sledgehammer*).

(38) Adjuncts incorporated in adjectival passives

a. depictives
*salted-dry nuts
*picked-late grapes
*shipped-(un)ripe tomatoes

*bathed-naked children
*served-fresh rolls

b. adverbs
*watered-delicately tulips
*spun-quickly yarn
*smashed-completely safe
*rubbed-lightly stones
*cooked-twice pork

c. nouns from inside PP adjuncts
*fed-force geese
*picked-hand strawberries
*ripened-tree pears
*drawn-machine plans
*watered-hose tulips
*spun-dryer sheets
*smashed-sledgehammer safe
*rubbed-hand stones

But the grammatical adjectival passives in (39) show that APF incorporates a variety of arguments.

(39) Arguments incorporated in adjectival passives
lulled-asleep audience
driven-home cattle
set-free tigers
left-home children
cast-asunder foes

Thus APF is another piece of evidence for the argumenthood of result XPs.

Like APF, the lexical process of Passive Compound Formation (PCF) in (40) applies to the output of Verbal Passive Formation (VPF). But it does just the opposite in that it incorporates adjuncts but not arguments. The PP in *pick berries* [*by hand*] is an adjunct.

(40) **Passive Compound Formation**
Externalize an internal argument of a passive verb to form an adjective.
Insert an adjunct as a modifier of the head.

AS of active verb:	a [a]	[$_{NP}$] [$_{V}$ *pick*] [$_{NP}$ *berries*] *by hand*
↓ VPF		
AS of passive verb:	[a]	[$_{NP}$ *berries*] *are* [$_{V}$ *picked*] *by hand*
↓ PCF		
AS of passive compound:	a [ ]	[$_{A}$ *hand* [$_{A}$ picked]] *berries*

After Verbal Passive Formation suppresses the verb's external argument, PCF externalizes the internal argument creating a passive verb form which it turns into an adjective, and makes it the head of a compound, inserting an adjunct – not to its right, where arguments are inserted by APF, but to its left. In (41a), the adjuncts are depictives, in (41b) adverbs, and in (41c), nouns, the same nouns that we saw in (38c) which could not incorporate in APF because adjuncts were blocked.[12]

(41) Adjuncts incorporated in passive compounds by PCF

a. depictives
dry-salted nuts
late-picked grapes
(un)ripe-shipped tomatoes
naked-bathed children
fresh-served rolls

b. adverbs
delicately-watered tulips
quickly-spun yarn
completely-smashed safe
lightly-rubbed stones
twice-cooked pork

c. nouns from inside PP adjuncts
force-fed geese
hand-picked strawberries
tree-ripened pears
machine-drawn plans

In contrast, arguments cannot be incorporated into passive compounds. The same verbs whose arguments were successfully incorporated by APF in (39) fail as inputs to PCF:

(42) Arguments incorporated in passive compounds by PCF
*asleep-lulled audience
*home-driven cattle
*free-set tigers
*home-left children
*asunder-cast foes

And, crucially, as we would predict, so do result XPs, confirming their argument status:

(43) Results incorporated in passive compounds by PCF
*flat-watered tulips

---

[12] We are assuming that passive compounds are derived directly from passive verbs, not from adjectival passives, so APF and PCF are two different operations that can apply to a passive verb. However, it is possible that PCF operates on the output of APF, but not on adjectival passives that have formed compounds: **lightly-rubbed-smooth stones* is not possible, though the passive compound *lightly-rubbed stones* and the adjectival passive *rubbed-smooth stones* are both grammatical.

*dry-spun sheets
*open-smashed safe
*smooth-rubbed stones

Bolstering this conclusion, these same verbs **can** undergo PCF when an adjunct XP replaces a result XP, and the verbs are used as simple transitive verbs with no resultative reading, as shown in (44):[13]

(44) Adjuncts incorporated in passive compounds by PCF
hose-watered tulips
dryer-spun sheets
sledgehammer-smashed safe
hand-rubbed stones

In sum, the APF and PCF facts, taken together, support treating the XP of a resultative as an argument of the verb.

5.2.1.4 Position Relative to Adjunct XPs

A fourth type of evidence that the result XP is an argument comes from order relative to adjuncts. As (45) illustrates, result XPs must precede instrumental PPs.

(45) a. She watered the tulips [$_{AP}$flat] [$_{PP}$with her watering can].
*She watered the tulips [$_{PP}$with her watering can] [$_{AP}$flat].

b. She ran her Nikes [$_{AP}$threadbare] [$_{PP}$with her heavy plodding steps].
*She ran her Nikes [$_{PP}$with her heavy plodding steps] [$_{AP}$ threadbare].

But other adjuncts, such as (a) manner adverbials, (b) temporal PPs and (c) beneficiary *for*-PPs can either precede or follow instrumentals, as shown for transitive *water* and intransitive *run*.

(46) a. She watered the tulips [$_{AdvP}$ deftly] [$_{PP}$ with her watering can].
b. She watered the tulips [$_{PP}$ for 30 seconds] [$_{PP}$with her watering can].
c. She watered the tulips [$_{PP}$ for her neighbor] [$_{PP}$with her watering can].

(47) a. She watered the tulips [$_{PP}$ with her watering can] [$_{AdvP}$ deftly].
b. She watered the tulips [$_{PP}$ with her watering can] [$_{PP}$ for 30 seconds].
c. She watered the tulips [$_{PP}$ with her watering can] [$_{PP}$ for her neighbor].

---

[13] Our generalizations about the elements possible inside compounds, both adjectival and verbal, follow the original, careful, generative work on compounds, but are updated to reflect the distinction between arguments and adjuncts and our use of AS and CS rather than subcategorization frames. See especially Roeper & Siegel (1978), but also Selkirk (1982), Lieber (1983), Fabb (1984), Sproat (1985), Levin & Rappaport (1986), Di Sciullo & Williams (1987), and Di Sciullo (1992). Spencer (1991) provides a summary of most of these works.

(48) a. She ran [$_{PP}$ for her coach] [$_{PP}$ with heavy plodding steps].
b. She ran [$_{PP}$ for 30 seconds] [$_{PP}$ with heavy plodding steps].
c. She ran [$_{AdvP}$ clumsily] [$_{PP}$ with heavy plodding steps].

(49) a. She ran [$_{PP}$ with heavy plodding steps] [$_{AdvP}$ clumsily].
b. She ran [$_{PP}$ with heavy plodding steps] [$_{PP}$ for 30 seconds].
c. She ran [$_{PP}$ with heavy plodding steps] [$_{PP}$ for her coach].

Since arguments must precede adjuncts, this difference is predicted if result XPs are arguments. In fact, as further predicted, they cannot follow *any* of these adjunct types:

(50) a. She watered the tulips [$_{AP}$ flat] [$_{AdvP}$ deftly].
b. She watered the tulips [$_{AP}$ flat] [$_{PP}$ in a few moments].
c. She watered the tulips [$_{AP}$ flat] [$_{PP}$ for her neighbor].

(51) a. *She watered the tulips [$_{AdvP}$ deftly] [$_{AP}$ flat].
b. *She watered the tulips [$_{PP}$ in a few moments] [$_{AP}$ flat].
c. *She watered the tulips [$_{PP}$ for her neighbor] [$_{AP}$ flat].

(52) a. She ran her Nikes [$_{AP}$ threadbare] [$_{AdvP}$ unintentionally].
b. She ran her Nikes [$_{AP}$ threadbare] [$_{PP}$ in a few days].
c. She ran her Nikes [$_{AP}$ threadbare] [$_{PP}$ for her self-image].

(53) a. *She ran her Nikes [$_{AdvP}$ unintentionally] [$_{AP}$ threadbare].
b. *She ran her Nikes [$_{PP}$ in a few days] [$_{AP}$ threadbare].
c. *She ran her Nikes [$_{PP}$ for her self-image] [$_{AP}$ threadbare].

5.2.2 The Argumenthood of the Postverbal NP

Resultative Formation has become a classic test for unaccusativity based on the fact that unaccusative verbs form resultatives without a postverbal NP, as in (54a), whereas transitive verbs, in (54b), and intransitive unergative verbs, in (54c), require one (Simpson, 1983a; Carrier & Randall, 1992; Levin & Rappaport, 1995). Since resultatives require a local postverbal NP for predication, the grammaticality of cases like (54a) could only be the result of movement.

(54) a. unaccusative: [*The rocks*]$_i$ rolled t_i smooth
b. transitive: The gardener watered *the tulips* flat.
c. intransitive: The joggers ran *their Nikes* threadbare.

But although these contrasts show that a local subject is necessary for the XP predicate, they do not bear on the status of this postverbal NP relative to the verb. In (24) we claimed that there is a difference in argument structure between transitive and intransitive resultatives: transitive resultatives have two internal arguments; intransitive (unergative) resultatives have one. So while the italicized NP is an argument of the verb in (54b), it is not an argument in (54c). Below we will briefly review and refine our arguments for this claim.[14] We leave unaccusative resultatives out of the discussion at this point, but we will return to them in Chapter 7.

5.2.2.1 Selection

Though as discussed above, selection does not require argumenthood, it is clear that a selected *obligatory* element *must* be an argument, a selected optional element is certainly consistent with its being an argument. So, to decide whether the postverbal NP in a resultative is an argument of the verb, the clearest cases to look at are resultatives formed from obligatorily transitive verbs. The verbs in (55) select animate objects, as do their resultative counterparts in (56).

(55) a. The bears frightened *(the hikers).
b. The magician hypnotized *(the volunteers).

(56) a. The bears frightened *(the hikers) speechless.
b. The magician hypnotized *(the volunteers) into a trance.

Notice that some transitive verbs can omit their objects and when they do, they have an indefinite object reading, as *water* does in (57b), allowing for an intransitive resultative reading on a typically transitive verb, as in (58b).

(57) a. The gardener watered the tulips.
b. The gardener watered (for hours).

(58) a. The gardener watered the tulips flat.
b. The gardener watered his sneakers soggy.
(cf. *The gardener watered his sneakers.)

But indefinite object readings are not possible for the verbs in (55). The ungrammaticality of (59) confirms that their postverbal NPs are indeed selected obligatory arguments.

(59) a. *The bears frightened the campground empty.
b. *The magician hypnotized the room quiet.[15]

So for resultatives based on obligatorily transitive verbs, the postverbal NPs are arguments.

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[14] Additional, more elaborated, arguments appear in Carrier & Randall (1992), though there the postverbal NP in transitive resultatives was claimed to be a **direct** internal argument of the verb. However, those arguments hold even under this weaker claim.

[15] Compare this example with *the magician hypnotized the audience quiet*. When *room* is understood as ‘the occupants of the room’, the sentence is grammatical, as is its non-resultative counterpart, *the magician hypnotized the room*.

5.2.2.2 Lexical Rules: Middle Formation, Nominal Formation, Adjectival Passive Formation and Passive Compound Formation

In Chapter 2, we showed that several lexical rules – Middle Formation, Adjectival Passive Formation and Nominal Formation – do not require a **direct internal** argument in order to apply but simply an **internal** argument. Below, we will show that the same requirement holds of Passive Compound Formation. These lexical word-formation processes are therefore good tests of the argumenthood of the postverbal NP in resultatives. If our claim is correct, that for transitive resultatives the postverbal NP is an internal argument of the verb, but for intransitive (unergative) resultatives it is not, then only transitive and not intransitive resultatives should undergo them.

Middle Formation gives the predicted outcome, as shown in (60).[16]

(60) a. Middles from transitive resultative verbs
NP water new seedlings flat → New seedlings water [t] flat (easily).
NP stretch that taffy thin → That taffy stretches [t] thin (easily).
NP cook sugary food black → Sugary food cooks [t] black (easily).
NP iron linen napkins smooth → Linen napkins iron [t] smooth (easily).

b. Middles from intransitive resultative verbs
NP run Nikes threadbare → *Nikes run [t] threadbare (easily).
NP talk some students into a stupor → *Some students talk [t] into a stupor (easily).
NP walk delicate feet to pieces → *Delicate feet walk [t] to pieces (easily).
NP crowed the children awake → *Some children crow [t] awake (easily).

Nominal Formation also reveals the predicted grammaticality difference in outputs from transitive and intransitive resultatives.

(61) Nominals from transitive resultatives
a. the watering of tulips flat (is prohibited by the Dutch authorities)
b. the cooking of food black (is something the Surgeon General warns against)
c. the slicing of hard cheeses thin (is a specialty of this cheese shop)

(62) Nominals from intransitive resultatives
a. *the running of Nikes threadbare (is a common problem of marathon runners)
b. *the shouting of throats hoarse (is something we experienced at last year's festival)
c. *the crowing of children awake (is a topic in this week's Farm News)

The cases in (62) fail because the *of*-NP is not licensed in any of the three ways discussed in Chapter 2. It does not correspond to an external argument (*the cooking of the famous chefs*; *the running of the marathoners*); or to an adverbial adjunct (*the cooking of the 50's involved lots of canned ingredients*; *the running of the 1990s*

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[16] The other condition on MF discussed in Chapter 2, the Theme Condition, is not relevant here since is satisfied by all the cases, as we will see in more detail in the next section.

gave way to lower impact sports) or, crucially, to an internal argument of the verb (*the running of marathons*; *the shouting of obscenities*). But those in (61) qualify, because their *of*-NPs all correspond to an internal argument of the verb.

Note that simply being in a syntactic postverbal position does not make an NP eligible for Nominal Formation, as is clear from the ungrammatical raising cases in (63):

(63) a. *The expecting of there to be a riot is in the news.
(from: NP expects there to be a riot.)
b. *The believing of there to be a spy among us is creepy.
(from: NP believes there to be a spy among us.)

Adjectival Passive Formation, too, distinguishes between transitive resultatives, (64), and intransitives, (65).

(64) Adjectival passives from transitive resultatives
a. watered-flat tulips
b. spun-dry sheets
c. smashed-open safe
d. rubbed-smooth stones

(65) Adjectival passives from intransitive resultatives
a. *run-threadbare Nikes
b. *danced-thin soles
c. *crowed-awake children
d. *shouted-hoarse throat

To create (64a), APF incorporates an argument, *flat*, into a new adjective *watered-flat*, and externalizes the remaining internal argument, *tulips*. The failure of the cases in (65) to undergo APF confirms that the postverbal NPs in the corresponding active sentences are not arguments.[17]

Finally, additional, though somewhat weaker, evidence comes from a rule that we looked at briefly above, Passive Compound Formation. Like APF, PCF externalizes an internal argument, but unlike APF, it incorporates only a non-argument, as the difference in acceptability between the passive compounds in (66a) and (66b) shows. In (66a), the rule of Verbal Passive Formation (VPF) externalizes the internal argument, and PCF incorporates the *by*-phrase adjunct. But in (66b), though the

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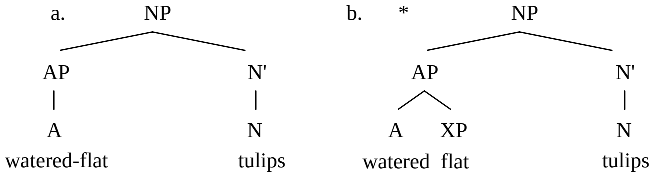
[17] It is clear that the argument *flat* is incorporated into a new lexical item *watered-flat* as in (ia) and is not simply a complement of the head adjective *watered* as in (ib), because first, the Head Final Filter (Williams, 1982, see also Levin & Rappaport, 1986) prevents prenominal adjectives from taking complements,

(i)



compound itself is fine, it cannot be predicated of *kids*, since *kids* is not an internal argument.

(66) read (books) (to kids) (by machine)

a. machine-read books (= books read by machine)
b. *machine-read kids (= kids read to by machine)

In (67) the ungrammaticality is caused by the reverse problem: an internal argument is externalized but the element incorporated is an argument.

(67) *home-sent kids
*captive-kept chickens
*together-glued pages
*free-set tigers
*loose-pulled nails

Given this, both transitive and intransitive resultatives are predicted to be ungrammatical. But the intransitives incur a double violation. Not only is the incorporated element an argument, the external NP was never an internal argument of the verb. They are predicted to be worse than the transitive cases. And to our ears, they are.

(68) a. Passive compounds from transitive resultatives
*flat-watered tulips
*dry-spun sheets
*open-smashed safe
*the smooth-rubbed stones

b. Passive compounds from intransitive resultatives
**threadbare-run Nikes
**thin-danced soles
**awake-crowed children
**hoarse-shouted throat

---

and second, only single words can be incorporated, which explains the contrast between the (a) and (b) cases in (ii), from resultatives, and (iii), from other verbs.

(ii)	a. watered-flat tulips	b. *watered-flat-as-pancakes tulips
	rubbed-smooth stones	*rubbed-silky-smooth stones
(iii)	a. sent-home kids	*sent-to-school kids
	kept-captive chickens	*kept-in-yards chickens
	glued-together pages	*glued-to-each-other pages
	set-free tigers	*set-free-from-captivity tigers
	pulled-loose nails	*pulled-out-of-boards nails

5.3 The Linking of Resultative Verbs and a Better Linking Theory

In the first two sections of this chapter we established the Conceptual Structure (CS) and Argument Structure (AS) of resultative verbs. Our Resultative Formation operation, RF (stated in (23), above) creates a resultative CS by embedding a non-resultative CS into a larger, more complex, CS. The embedded, "inherited", CS – whatever it is – becomes the agent of the output resultative verb's CS. We then showed that the AS of every resultative verb differs from the AS of its non-resultative counterpart in having an additional internal "result argument" that the non-resultative lacks, shown in bold in (69).

(69)

	AS of base verb		AS of resultative verb
transitive:	a [a]	→	a [a **a**]
unaccusative:	[a]	→	[a **a**]
unergative:		→	a [**a**]

Transitive input verbs have two arguments – one external, one internal – and the output resultative verb has one more. Unaccusative inputs and unergative inputs, each with one argument, both yield resultatives with one additional internal argument. Having established what resultative CSs and ASs look like, we still have to answer the question of how resultative CSs map to their ASs, that is, how they link. We turn to this now.

5.3.1 *The Linking of the Inherited Arguments and a Relativized Isomorphic Linking Hypothesis*

To see how resultative verbs link, first consider the linking for non-resultative verb, like *water* in (70).

(70) non-resultative *water*

DS: $[_{NP}$ the gardener] watered $[_{NP}$ the tulips]
| |
AS: a [a]
| |
CS: [CAUSE (W, [BECOME (<WATER>, $[_{PLACE\text{-}c}$ AT x])])]

Water, under this analysis, is similar to *put*, with two linking CS constituents, w and x, but it differs in having an incorporated, non-linking theme, <WATER> (parallel to our first analysis of *butter* in Chapter 4, Section 2.1.1). According to the ILH, repeated in (71), (from Chapter 3, (6)), w, the agent, is higher than x, so it links to the external argument position.[18]

(71) **Isomorphic Linking Hypothesis** (preliminary version)
The linking nodes at CS map isomorphically into the terminal nodes at AS.

We have argued in Section 1, above, that to construct a resultative verb, Resultative Formation (RF), repeated in (72a), and in tree-form in (72b), inherits the CS of the input verb – including linking lines – as the first argument of a higher CAUSE predicate.

(72) **Resultative Formation**

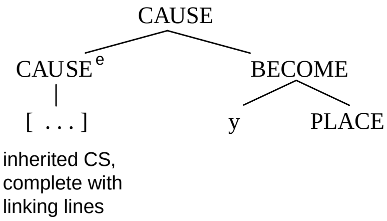
a.

CS of base verb: $[_{\text{EVENT}} \ldots]$

↓ Resultative Formation (RF)

CS of resultative verb: $[\text{CAUSE}\ (\underbrace{[_{\text{EVENT}} \ldots]^{e}}_{\text{inherited CS}},\ \underbrace{[_{\text{EVENT}} \text{BECOME}\ ([_{\text{THING}} \ldots], [_{\text{PLACE}}\ \text{AT} \ \ldots])]}_{\text{result clause}})]$

b.



When RF applies to *water*, this yields (73a), or its equivalent, (73b).[19]

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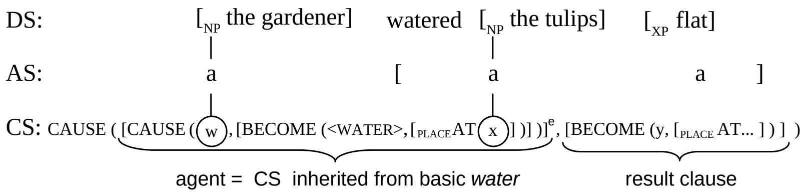
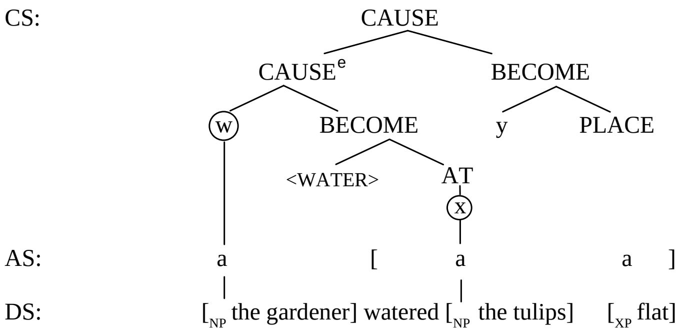
[18] Even if *water* means ‘w causes y to ingest water’, as suggested in note 6, in Section 1 of this chapter, w is higher than x.

[19] Although these simplified trees omit EVENT labels above CAUSE and BECOME, the relative level of embedding of the arguments is not affected.

(73) a. resultative *water* (partially linked)


DS:
[NP the gardener]
watered
[NP the tulips]
[XP flat]
AS:
a
[
a
a
]
CS: CAUSE ([CAUSE (w), [BECOME (<WATER>, [PLACE AT (x)])])]e, [BECOME (y, [PLACE AT...])])
agent = CS inherited from basic water
result clause

b. resultative *water*



The two inherited arguments, w and x, which correspond to the subject (*the gardener*) and the postverbal NP (*the tulips*) will inherit their linking lines and link as the external and internal arguments. But what about the arguments in the newly added BECOME clause, y and PLACE?

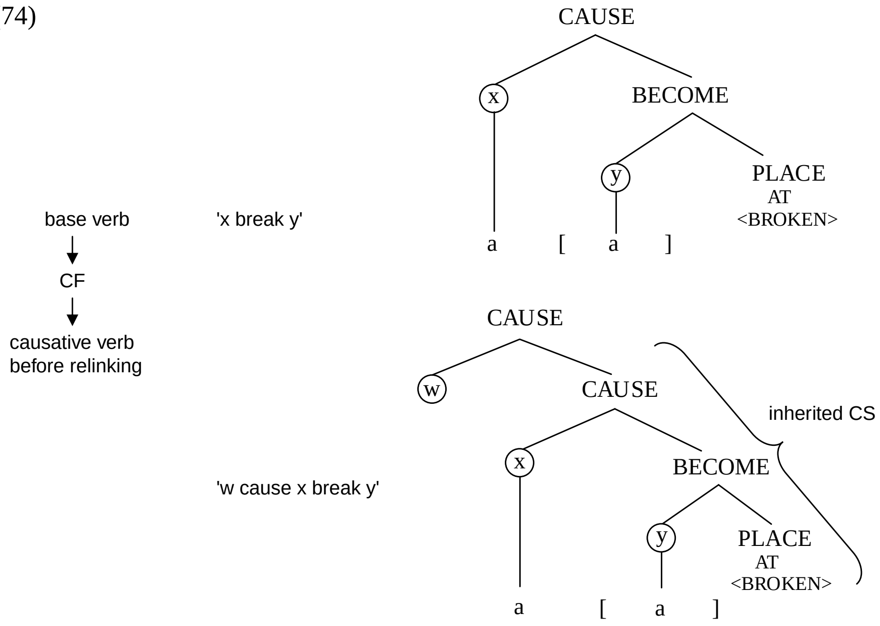
This is clearly a problem for the ILH, which stipulates that the geometry of the terminals in (73) must be preserved. First, already-linked w is at the same CS level as both y and PLACE. So all three should be linked to the same AS level. Second, already-linked x is more deeply embedded in CS than PLACE, so it should link to a relatively lower AS position.

We know what the outcome should be. As shown in Section 2, above, the result XP is an internal argument. So it must end up linked to an internal position in AS. The postverbal NP is an argument as well, so if the linking of x is preserved, y cannot link. But how can this be achieved under the ILH? We have seen how word-formation processes force already-linked inherited arguments to delink. Could this be the case in the linking for Resultative Formation?

In the examples that we saw in Chapter 3, an inherited argument is forced to delink when a new argument needs to link and either (a) there is no AS position available or (b) the only available AS position would cause an ILH violation. And delinked arguments relink only if the output satisfies the ILH. Recall Causative Formation (CF). It takes an input verb like *x break y* and creates an output verb meaning *w cause* [*x break y*], where the base verb's CS is inherited into the new causative verb's CS as the second argument of CAUSE.

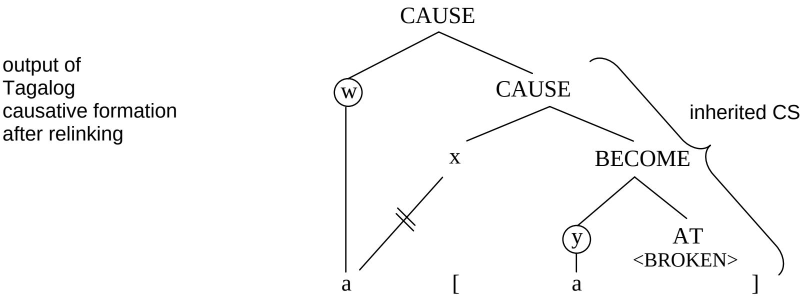
As shown in (74), the input verb *break* links two arguments to AS: x, externally and y, internally. But in the new causative verb, w must also link, causing a linking conflict.

(74)



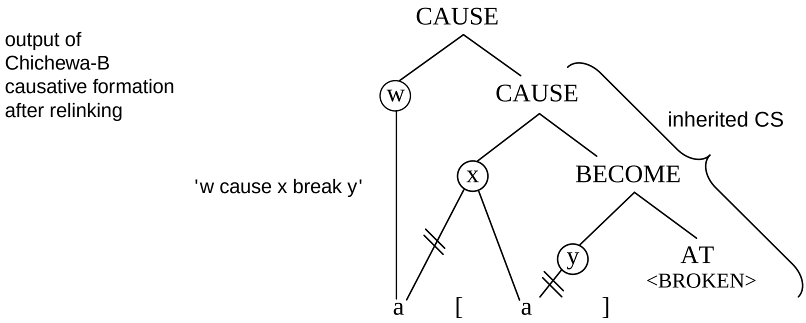
We saw that Tagalog resolves the conflict by delinking the old external argument, x. The relinking is shown in (75): w is linked to the external argument position and x is no longer an argument of the verb, but can be realized as an adjunct.

(75)



In contrast, in Chichewa-B in (76), x is delinked from the external argument position to which w then links, but x relinks to an internal AS position, bumping the inherited linked internal argument, y.

(76)



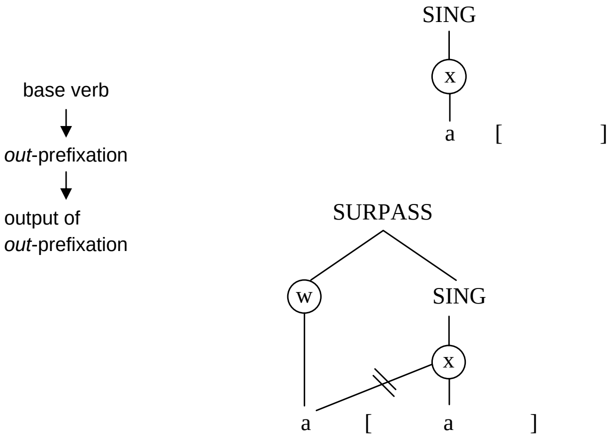
Both of these outputs satisfy the ILH.[20]

English *out*-prefixation in (79) uses the same strategy as Chichewa-B.

(77) a. The soprano can sing.
b. The alto can outsing the soprano.

It applies to a verb like *x sing* to form a new verb like *w outsing x*, meaning ‘w surpasses x in singing’, where a newly-added argument is higher in CS than the inherited argument.[21]

(78)



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[20] Recall that for input verbs like *sing* or *write* with an external but no internal argument, Tagalog also adopts the Chichewa-B solution. Because there are more empty argument positions in the template, in the output verb the delinked external argument relinks internally and no argument needs to be bumped.

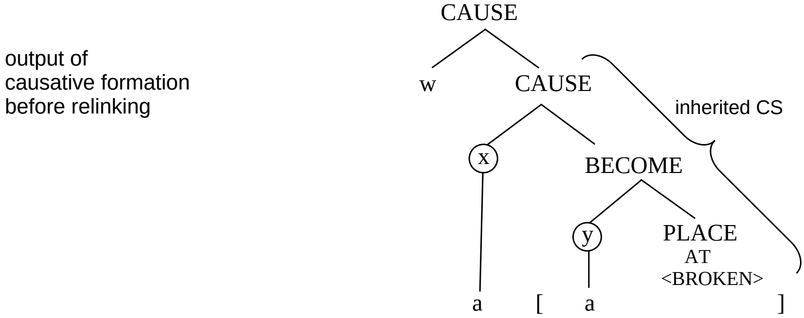
[21] Recall from Chapter 3 that we are representing unergatives like *sing* in this abbreviated way, since the more complex CSs give the same result: the sole linking argument links externally.

The new argument, w, links to the external AS position, in turn de-linking the inherited argument, x, which then relinks internally.[22] Again, the ILH is obeyed.

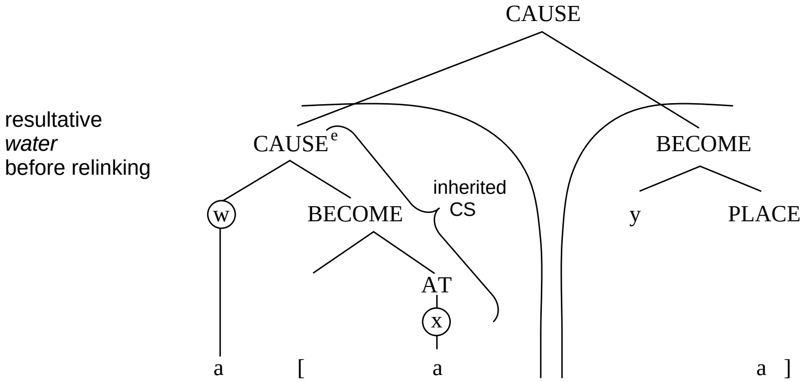
Let us now return to the inheritance of linking lines in resultative *water* in (73). Can de-linking and re-linking either of the inherited arguments resolve the linking conflict? The answer is no. w and PLACE sit at an equal CS level, both higher than x. Since there is only one external argument position, delinking will not help. But there is a crucial difference between the CS outputs of RF and the other rules we have seen so far, which we can exploit in finding a solution.

Compare the output of CF with the output of RF, before any relinking occurs, in (79) and (80).

(79)



(80)



Causative Formation, in (79), adds a new CAUSE function node that dominates the new argument, w, as well as the inherited linked arguments, x and y. In contrast, Resultative Formation adds two new CS arguments, y and PLACE, inside a new

---

[22] There are other ways that word-formation rules can trigger the delinking of an inherited argument as a side-effect. The Implicit Reflexive Object Formation rule discussed in the last chapter does not stipulate delinking; rather, it binds one CS argument to another, the lower of which must be unlinked, according to the Bound Argument Convention, stated in (96) in Chapter 4, Section 3. A word-formation rule can also specify delinking directly. For example, as we saw, Passive Formation, Middle Formation, and Nominal Formation explicitly delink the external argument and inherit the remaining linking lines – but do not relink the external argument – in the output.

BECOME function that does **not** dominate the CS arguments inherited from the base verb, w and x. Rather, the two sets of CS arguments in the RF output are in two separate c-command domains as indicated in (80) with curved lines. To indicate that these domains are in CS, we will refer to them as "CS Domains", defined as in (81). And we will define in (82) and (83) the c-command relations for CS function nodes, "CS c-command" and the asymmetric relation "Asymmetric CS c-command":

(81) **CS Domain**
Two CS constituents, A and B, are in the same CS Domain iff A CS c-commands B or B CS c-commands A.

(82) **CS c-command**
For two CS constituents, A and B, A CS c-commands B iff the first branching CS function node dominating A dominates B.

(83) **Asymmetric CS c-command**
For two CS constituents, A and B, A asymmetrically CS c-commands B iff the first branching CS function node dominating A dominates B and not vice-versa.

The geometry of CS Domain and CS c-command in CS representations naturally corresponds to the geometry of c-command domain and c-command in syntactic representations, and thus, provides a locality measure at the CS level.

Now, suppose that the ILH operates relative to each CS Domain. We can restate the ILH as in (84), its final form.

(84) **Isomorphic Linking Hypothesis** (final version)
The linking nodes at CS map isomorphically into the terminal nodes at AS *within each CS Domain*.

What this means is that within each CS Domain, if A CS c-commands B then for the elements that they link to in AS, call them (a, b), a must c-command b. Similarly, if (A, B) CS c-command each other, then (a,b) must c-command each other. Whatever geometric relation holds in CS must hold in AS.

This revised ILH will get us part-way to a solution for resultative CSs like (80): w and x are in a CS c-command relationship, and their linking obeys the ILH. However, no CS c-command relationship holds between w and x and either y or PLACE. Being in two separate CS domains, their relative CS positions are not governed by the ILH. w and x can inherit their linking lines and not be affected by these arguments. But now we must address the question of how y and PLACE **do** link, which we will do in the next section.

Before doing so, though, we should point out that the revised ILH makes the same prediction as the original one for the other derivations we have seen. For out-prefixation, in (78), the new agent, w, CS c-commands x. Their AS positions will be isomorphic with these CS positions when w displaces x to become the external AS argument and x relinks internally. In causatives, (79), the new agent, w, also CS c-commands the other linking arguments. When it displaces x, x can either stay unlinked (as in Tagalog) or relink (as in Chichewa-B), delinking a more deeply embedded argument in the process. Either way, the output argument geometries at CS and AS are isomorphic.

5.3.2 A New Kind of AS–CS Mismatch: Nonlinking Themes

Returning to (80), the question is how the theme y and the PLACE in the newly added result BECOME clause link. In fact, the question applies to the outputs of all resultatives, as shown in (85).

(85) **Resultative Formation**

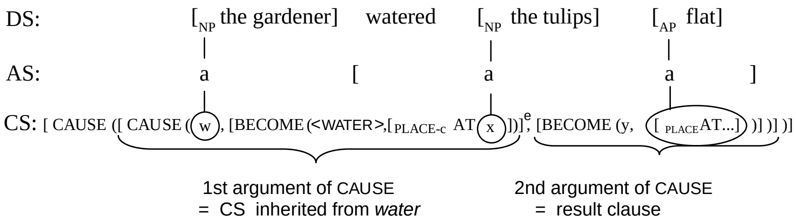
CS of base verb: $[_{\text{EVENT}}\ \ldots\ ]$

↓ Resultative Formation (RF)

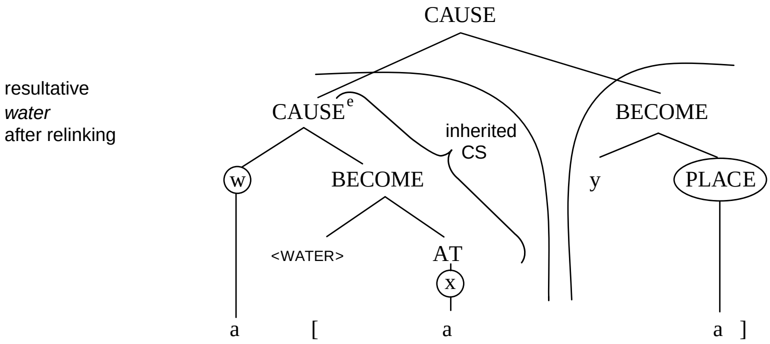
CS of resultative verb: $[\text{CAUSE}\ \ (\underbrace{[_{\text{EVENT}} \ldots\ ]^{e}}_{\text{inherited CS}}\ ,\ \underbrace{[_{\text{EVENT}}\text{BECOME}\ (\ [_{\text{THING}} \ldots\ ]\ ,\ [_{\text{PLACE}}\ \text{AT}\ \ \ldots\ \ ]\ )]}_{\text{result clause}}\ \ )]$

Section 2.1 presented evidence that the result XP is an argument for **all** resultatives, which means that the CS PLACE **must** link, as shown (85) with a linking circle. But, as we have argued in earlier work (Carrier & Randall, 1993), the theme, y, does not link. When RF applies to the base verb *water* to create the new CS for the resultative verb *water* in (80), the base verb's CS and AS are inherited along with two linking lines, and the PLACE links as a third, internal, argument, as shown in (86a), translated into tree form in (b).

(86) a.

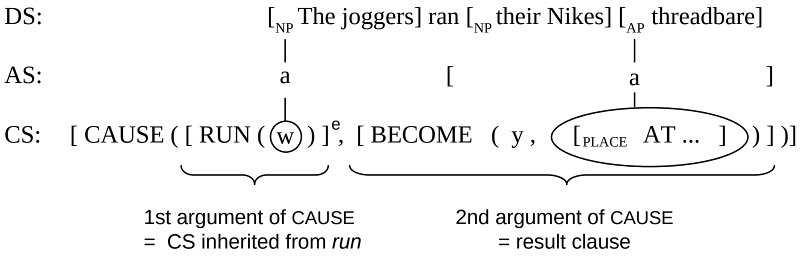

DS:
[NP the gardener]
watered
[NP the tulips]
[AP flat]
AS:
a
[
a
a
]
CS: [CAUSE ([CAUSE (w), [BECOME (<WATER>,[PLACE-c AT x])]e, [BECOME (y, [PLACE AT...])])])]
1st argument of CAUSE
= CS inherited from water
2nd argument of CAUSE
= result clause

b.



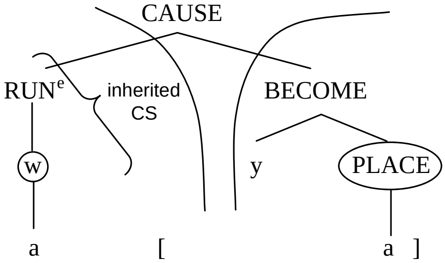
The linking of the new PLACE is similar for intransitive resultatives such as *run*, shown in (87).

(87) a.


DS:
[NP The joggers] ran [NP their Nikes] [AP threadbare]
AS:
a
[
a
]
CS:
[CAUSE ([RUN (w)]e, [BECOME (y , ([PLACE AT ...]))])]
1st argument of CAUSE
= CS inherited from run
2nd argument of CAUSE
= result clause

b.

resultative
run
after relinking



Now let us turn to y, the "result theme" in the added result clause. This argument cannot link. If it did, it would predict that transitive resultative *water* has three internal arguments instead of two, with three postverbal XPs in the syntax, as in (88).

(88) *The gardener watered [the tulips] [her sneakers] [wet].

And intransitive resultatives would have *two* internal arguments instead of one. Now, although there are always two postverbal constituents in intransitive resultatives, the postverbal NP is not an argument. In contrast to the postverbal NP in transitive resultatives, this NP fails the tests for argumenthood: Middle Formation, Adjectival Passive Formation and Nominal Formation, as discussed in Section 2 of this chapter (see also Carrier & Randall, 1992, 1993).

(89) a. intransitive MF: *Nikes run threadbare easily.
APF: *the run-threadbare Nikes
NF: *the running of Nikes threadbare

b. transitive MF: Dutch tulips water flat easily.
APF: the watered-flat tulips
NF: the watering of tulips flat

Thus (85), with a non-linking y theme, is the final version of RF. For both types of resultatives, the theme in the result clause does not link and an additional PLACE argument is introduced by RF with a linking circle. This means that both types of resultatives involve an AS-CS mismatch; there is a theme in CS which does not project to a syntactic argument position.

The failure of the theme in the CS result clause to link to an AS position immediately raises two questions. First: how does this unlinked result theme get construed as the postverbal NP? Second, is it a quirk of RF that it introduces a non-linking implicit theme? Or does this follow from something more general? We now address the first of these questions. The second is the topic of the next chapter.

5.4 Clausal Fusion: Interpreting the Unlinked Theme

The first of the two questions we need to address is this: if the theme in the result BECOME clause does not link for either transitive or intransitive resultatives, how does it get identified with the postverbal NP? To put it another way, how does the postverbal NP come to be understood as undergoing the resultant change-of-state? Since y is unlinked, we might expect that it would not be identified with any NP in the syntax but be interpreted as an implicit argument. *The gardener watered the tulips flat* would mean: 'the gardener's watering the tulips (to such an extent) caused **something or other** to become flat', just as *the gardener watered all day long*, means 'the gardener watered **something or other** all day long'. It would not require, as it does, that what gets watered are the tulips.

Let us approach the question by considering how the CS of this resultative sentence is built up through argument fusion. *The gardener* is identified as the external argument of *water*, so its CS fuses with w. *The tulips* is identified with the internal argument, so its CS fuses with x. Since *flat* is identified with the remaining AS position, linked to the PLACE in the result clause, its CS fuses with PLACE.[23] These fusions give us the intermediate CS in (90).

(90) CAUSE

$$\text{(}\underbrace{\text{[CAUSE ([}_{\text{THING}}\text{ THE GARDENER], [BECOME ([}_{\text{THING}}\text{ WATER], [}_{\text{PLACE-c}}\text{ AT [}_{\text{THING}}\text{THE TULIPS]])]}^{e}}_{\text{1st argument of CAUSE = CS inherited from }\textit{water}}$$

$$\underbrace{\text{[BECOME (y , [}_{\text{PLACE}}\text{AT [FLAT]])]}}_{\text{2nd argument of CAUSE = result clause}}\text{)}$$

So far, nothing has fused with y, which would be fine if y were not identified with an NP. But y has to be interpreted as *the tulips*.[24]

---

[23] Recall that eliminating the direct/indirect internal argument distinction in Chapter 2 means that now nothing in our linking theory prevents *the tulips* from identifying with the AS position linked to PLACE and *flat* from identifying with the AS position linked to y. However, these fusions are prevented by selectional restrictions.

[24] Thanks go to John Frampton for helping us to see the problem in this way.

Our solution derives from an insight of Rapoport (1986), developed in Carrier & Randall (1993), that adjectives (and prepositions) are predicates with argument structures of their own. *Flat* has an AS with one external argument.[25] And assuming a locality condition on predication (eg. mutual m-command as in McNulty, 1988; Carrier & Randall, 1992), this external argument is identified with the postverbal NP. This means that for a transitive resultative, the postverbal NP simultaneously satisfies an internal position in the AS of the verb and the external position in the AS of the adjective, as shown in (91). (We omit CSs here for simplicity.)

```
(91)  AS for flat:                                                    a              [         ]
                                                                      |
                                           [NP The gardener] watered [NP the tulips] [AP flat].
                                            |                         |               |
       AS for resultative water:            a               [         a               a        ]
```

In Chapter 1, we saw the analogous situation for NPs in sentences like *we discussed the organizing of fundraisers*. The entire NP *the organizing of fundraisers* is an internal argument of *discussed*, but the noun *organizing* also heads its own AS with one internal argument, *fundraisers*.[26] Thus, the ASs of *organize* and *discuss* are both satisfied by the sentence in (92).

```
(92)  AS for organizing:                              [                   a               ]
                                                                          |
                                 [NP We] discussed [NP the organizing of [NP fundraisers] ]
                                  |                 |
       AS for discuss:            a        [        a         ]
```

In (91) not only do the AS domains of resultative *water* and *flat* overlap; their CSs do as well. It is this that will explain the construal of the result theme in the CS of the verb. But to see how, we need a CS for the adjective *flat*.

So far we have been assuming that the CS of a state adjective consists simply of an abstract PLACE, as in (93a). Such CSs satisfy the selectional restrictions of abstract PLACE-taking verbs like *become* and *render* (94a, b) but not *put*, (94c), which typically takes a concrete PLACE, and is compatible with the CS of a preposition like *into*, in (93b).[27]

---

[25] The claim that adjectives have external arguments goes back to Williams (1980). Some adjectives and prepositions have internal arguments as well. In *She punched the bag full of holes*, *full* takes an external argument, *the bag*, and an internal argument, *holes*.

[26] This noun can also have a second, external, argument: *Pat's* in *Pat's organizing of fundraisers*.

[27] We are considering *into* here as specifying a location. But *into* is actually underspecified and can also specify a state, as can most prepositions: *Meditation puts him into a calm mental state* (= calm); *a winning lottery number got our neighbor suddenly into the limelight* (= well-known); *the electrical surge rendered those computers out of sync* (= unsynchronized); *those shoes very quickly became out of style* (= unfashionable).

(93) a. CS of *flat*: [$_{\text{PLACE-a}}$ <FLAT>]

b. CS of *into*: [$_{\text{PLACE-c}}$ AT [$_{\text{PLACE-c}}$ IN [$_{\text{THING}}$]]]

(94) a. CS of *become*: [BECOME (x, [$_{\text{PLACE-a}}$])]

b. CS of *render*: [CAUSE (w, [BECOME (x, [$_{\text{PLACE-a}}$])])]

c. CS of *put*: [CAUSE (w, [BECOME (x, [$_{\text{PLACE-c}}$])])]

In fact, we would like to suggest that the CSs in (93) are actually more complex. As shown in (95) for *flat*, they consist of a CS clause headed by BE(COME), and two arguments, a non-linking internal PLACE, which is a constant, and an externally linking theme, z, (the THING theme that is or comes to be in the state).[28]

(95) AS: a [ ]
flat
CS: [BE(COME) (ⓩ , [$_{\text{PLACE-a}}$ AT [<FLAT>]])]

The CS of the noun identified as this external argument – the noun modified by *flat* – fuses with z in the CS of *flat*. In our transitive resultative, this would be the CS of *the tulips*, as shown in (96).

(96) DS: . . . [$_{\text{NP}}$ the tulips] [$_{\text{AP}}$ flat]
AS: a [ ]
flat
CS: [BE(COME) ([$_{\text{THING}}$] , [$_{\text{PLACE-a}}$ AT [<FLAT>]])]
↓
fusion
↓
CS after fusion: [BE(COME) ([$_{\text{THING}}$ THE TULIPS] , [$_{\text{PLACE-a}}$ AT [FLAT]])]

It is now clear why the theme (y) in the result clause of resultative *water* in (90) will not be left unconstrued in the CS of the resultative sentence. Recall that we had originally assumed that fusing all of the verb's arguments with the verb's CS gave the intermediate CS in (90), repeated in (97), with nothing fused with y.[29]

---

[28] COME is parenthesized, to account for the difference between (i) and (ii).

(i) The tulips got flat. BECOME
(ii) The tulips are flat. BE

BE alone also characterizes state adjectives used attributively; *the flat tulips* means ‘the tulips that *are* flat.’ Proposing that the CS of a state adjective contains BE (COME) also supports our move in Chapter 1 to replace Jackendoff’s primitive function GO with BECOME. Otherwise, the CS for *flat* would have to include a disjunction to explain how it fuses with either *be* or *become*: [{BE/GO} (y, [$_{\text{PLACE-a}}$ AT [FLAT]])].

(97)

$$
\begin{array}{l}
\text{CAUSE} \\
(\ \underbrace{[\text{CAUSE}\ (\ [_{\text{THING}}\ \text{THE GARDENER}]\ ,\ [\text{BECOME}\ (\ [_{\text{THING}}\ \text{WATER}]\ ,\ [_{\text{PLACE-c}}\ \text{AT}\ [_{\text{THING}}\ \text{THE TULIPS}]\ ]\ )\ ]^{e}}_{\text{1st argument of CAUSE = CS inherited from } \textit{water}} \\
\qquad\qquad\qquad\qquad\qquad \underbrace{[\text{BECOME}\ (y\ ,\ [_{\text{PLACE-a}}\ \text{AT}\ [\text{FLAT}]\ ]\ )]}_{\text{2nd argument of CAUSE = result clause}}\ )
\end{array}
$$

This was because at that point our CS for *flat* was simply $[_{\text{PLACE-a}}$ AT [<FLAT>]]. When this CS fuses with the PLACE in the CS of the resultative verb, nothing fuses with the theme y. Given our new claim that *flat*'s CS is the entire clause in (95): [BE(COME) ($[_{\text{THING}}$], $[_{\text{PLACE}}$ AT [<FLAT>]])], now when this CS fuses with the verb's CS (as the internal PLACE argument of the verb), what fuses is the whole CS clause in (96) – itself the product of argument fusion – as shown in (98). In the process of fusing the CS of [... (*the tulips*) *flat*] with the CS of resultative *water*, [THE TULIPS] contained in the CS of the adjective ends up fusing with y in the CS of the verb, the outcome that we want. (For readability, we are abbreviating the CS of the inherited portion of the resultative CS.)

(98)

Clausal Fusion (transitive resultatives)

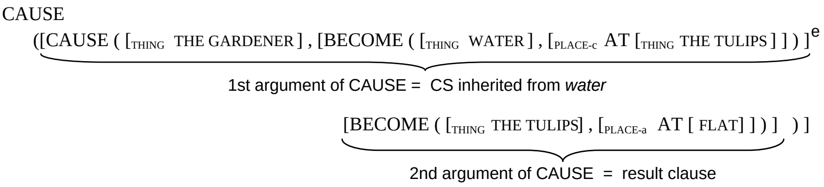
$$
\begin{array}{lll}
\text{CS of [... \textit{the tulips flat}]:} & & [\text{BECOME}\ \ ([_{\text{THING}}\ \text{THE TULIPS}]\ ,\ [_{\text{PLACE-a}}\ \ \text{AT}\ [\text{FLAT}]\ ]\ )] \\
\text{(from (96))} & & \qquad\qquad\qquad\qquad\downarrow \qquad\qquad\quad \downarrow \\
\text{CS of resultative verb:} & [\text{CAUSE}\ \ (\ \underbrace{[\ ...\ ]^{e}}_{\text{inherited CS}}, & [\text{BECOME}\ \ ([_{\text{THING}}\qquad\qquad]\ ,\ [_{\text{PLACE}}\ \ \text{AT}\ \ ...\ \ ]\ )]\ )] \\
\text{CS after fusion} & & \\
\text{in the result clause:} & [\text{CAUSE}\ (\ \underbrace{[\ ...\ ]^{e}}_{\text{inherited CS}}, & [\text{BECOME}\ \ ([_{\text{THING}}\ \text{THE TULIPS}],\ [_{\text{PLACE}}\ \ \text{AT}\ [\text{FLAT}]\ ]\ )])]
\end{array}
$$

Returning to the "inherited CS" portion of (98), this is filled by fusion. As shown in (90) above, [THE GARDENER] and [THE TULIPS] fuse with the two inherited CS argument positions. This output is (99), the CS for the whole sentence.

---

[29] Notice that there is no problem fusing the CS of *flat*, specified as an abstract PLACE-a, into the underspecified PLACE constituent in the resultative, which accepts both abstract and concrete PLACEs. When it fuses, we assume that it takes its label with it, adding a state "-a". When the fusing PLACE constituent is a location, its "-c" label will further specify the PLACE, as in *the dentist wiggled the tooth out of Noa's mouth*.

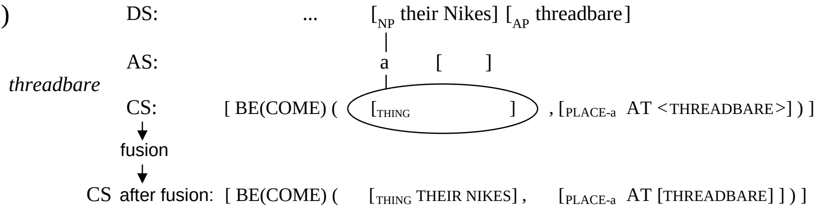
(99)


CAUSE
([CAUSE ([THING THE GARDENER] , [BECOME ([THING WATER] , [PLACE-c AT [THING THE TULIPS]])]e
1st argument of CAUSE = CS inherited from *water*
[BECOME ([THING THE TULIPS] , [PLACE-a AT [FLAT]])])]
2nd argument of CAUSE = result clause

Notice that the CS of *the tulips* fuses in two separate places in the CS of the sentence through two separate applications of fusion. On the bottom line of (99) it fuses with y, the THING in the result clause, because *the tulips* satisfies the external argument position in the AS of *flat*. On the top line, it fuses with the THING inside the PLACE in the inherited CAUSE clause, because *the tulips* also satisfies an internal argument position in the AS of *water*.

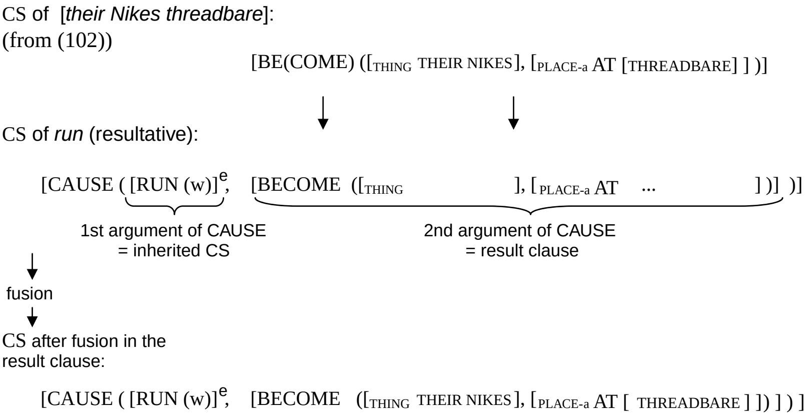
Now consider how Clausal Fusion works for intransitive resultatives like *the joggers ran their Nikes threadbare*. *Run* has two arguments, *the joggers* and *threadbare*. But *threadbare* has its own argument, *their Nikes*. (100) shows how fusion operates on the lexical entry of *threadbare* to produce the CS for [... *(their Nikes) threadbare*]. (Notice that in *threadbare*'s CS, the angled brackets indicate that <THREADBARE> is an implicit argument.)

(100)


DS:
...
[NP their Nikes] [AP threadbare]
AS:
a
[ ]
threadbare
CS:
[BE(COME) ([THING] , [PLACE-a AT <THREADBARE>])]
fusion
CS after fusion: [BE(COME) ([THING THEIR NIKES] , [PLACE-a AT [THREADBARE]])]

Now the CS of *threadbare*, which includes its argument [THEIR NIKES], fuses with the CS of *run*. As (101) shows, [THEIR NIKES] already fused in the CS of the adjective fuses with the theme y, in the result clause in the CS of the verb.

(101) Clausal fusion (for intransitive resultatives)


CS of [*their Nikes threadbare*]:
(from (102))
[BE(COME) ([THING THEIR NIKES], [PLACE-a AT [THREADBARE]])]
CS of *run* (resultative):
[CAUSE ([RUN (w)]e, [BECOME ([THING], [PLACE-a AT ...])])]
1st argument of CAUSE
= inherited CS
2nd argument of CAUSE
= result clause
fusion
CS after fusion in the
result clause:
[CAUSE ([RUN (w)]e, [BECOME ([THING THEIR NIKES], [PLACE-a AT [THREADBARE]])])]

Finally, since *the joggers* is the external argument of *run*, its CS fuses with w in (101). The result is the CS for the entire sentence, *the joggers ran their Nikes threadbare*:

(102) [CAUSE ([RUN ([$_{\text{THING}}$ THE JOGGERS])]^{e}, [BECOME ([$_{\text{THING}}$ THEIR NIKES],[$_{\text{PLACE}}$ AT [THREADBARE]])])]

To summarize so far, the verb's unlinked theme gets the interpretation that it does because the CS of the result adjective is itself a result clause. When this clause fuses with the result clause in the resuetative CS of the verb, the theme, y, in the verb's CS is filled in.

It is important to point out that our solution extends Jackendoff's use of fusion in a major way. For Jackendoff, the CS of a THING or a PLACE fuses with either a THING or a PLACE in a verb's (or preposition's) CS. We are proposing that the CS of an XP argument of a verb consists of an entire CS clause and, as such, fuses with a whole clause in the CS of that verb. For us, fusion can operate on any CS constituent, not just THINGs and PLACEs but also entire CS clauses, as long as selectional restrictions are obeyed.

There is a more radical way in which our use of fusion differs from Jackendoff's. Originally we claimed that the result argument in AS links to a PLACE in a resultative verb's CS, or, to put it another way, that there is a linking circle around [$_{\text{PLACE}}$], with which the CS of a PLACE must fuse. Now we see that the PLACE CS of the result XP is actually too big to fuse only with [$_{\text{PLACE}}$] in the resultative verb's CS. It "spills" leftward, fusing with the entire constituent, [BECOME (y, [$_{\text{PLACE}}$])]. So the circled constituent defines the starting point for fusion; in (98) [$_{\text{PLACE-a}}$ AT <FLAT>] in the CS of *flat* is lined up with [$_{\text{PLACE}}$] in the CS of resultative *water*. The remaining portion of *flat*'s CS clause is overlaid on top of the result clause in the verb's CS.[30]

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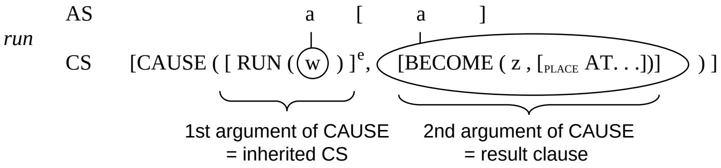
[30] An alternative analysis is that it is the entire result clause that links to an AS position.



Under this scenario, the non-linking of the result theme would also be explained: if the entire clause links, then nothing inside it could. There would still be a contrast between verbs whose entire result clause links (e.g. resultatives and, as we will see, *put* and *render*) and the implicit PLACE verbs discussed in the last chapter (e.g. *break* and *bag*), whose theme inside the result clause links, not the entire clause. At this point, we do not have enough evidence to decide between these two possibilities.

A reviewer suggests that if what links is the entire clause, then, holding onto the idea that geometry is preserved in mapping relations, the CSs we are proposing are most naturally expressed by a small-clause syntax, for intransitives:

Let us sum up. In Chapter 4, we discussed verbs like *cook* and *deliver* with CS THING (theme) and PLACE constituents that do not obligatorily link to the syntax. When they are not syntactically realized, they are understood implicitly. We are now claiming that RF also introduces a CS argument that does not link, the theme in the result BECOME clause. In fact, this theme **cannot** link, since as our argument tests show, transitive resultatives have two internal arguments, not three; and intransitive resultatives have one, not two. However, the unlinked theme in a resultative CS is different from an unlinked implicit argument. It is always identified with an overt postverbal NP. Though it is possible to say *they cooked all afternoon*, where the unlinked theme has an indefinite reading ('they cooked something or other'), it is not possible to say **they ran threadbare* and mean 'they ran something or other threadbare.' But this is because of the requirements of *threadbare*, not *run*; the AS of *threadbare* requires a local external argument, which the postverbal NP *their Nikes* satisfies. So the theme is implicit, but only from the point of view of the CS of the verb.

We have just shown how the CS of the postverbal NP is fused with the unlinked theme in the CS of the verb, without involving the verb's AS. It is a side-effect of fusing the CS of the result XP, which overlaps with the BECOME clause in the CS of the verb. In addition, for transitive resultatives, the verb and the result XP have overlapping AS domains in the syntax, so the postverbal NP satisfies a position in the AS of both.

To conclude, although RF creates an AS-CS mismatch by introducing a non-linking theme, the fusion of the already "fused-into" result XP accounts for the interpretation of that theme. This is the answer to the first question posed at the end of the previous section of this chapter, namely, how is the unlinked result theme identified with the postverbal NP.

(i) $[_{IP}$ the joggers I $[_{VP}$ ran $[_{FP}$ their Nikes F $[_{AP}$ threadbare]]]]

However, as we argued in Carrier & Randall (1992), there are problems with a small-clause structure for resultatives beyond its empirical inadequacy to capture the argumenthood of the constituents contained in the SC, among them the necessity for case-marking across an XP boundary. See Emonds (2000, Chapter 8) for additional arguments.

Chapter 6
The Prohibition Against Double Fusion

The second question posed at the end of Chapter 4 was whether it is an arbitrary property of RF that it does not link the result theme, or whether there is something general that precludes it from doing so. Notice that it would not be a strike against our analysis if this property of RF had to be stipulated. Linking is not predictable *purely* on the basis of meaning; lexical items and lexical rules stipulate which CS constituents link to AS positions. *Go* links its PLACE; *enter* links the THING inside it. *Butter's* theme is non-linking as is *bag's* place. Yet for *cook* and *deliver*, these same arguments can either link or not. Passive Formation inherits the CS of its input verb but delinks the CS constituent linked to the external argument. The rule that derives the verb $[_v$ bag] from the noun embeds the noun's CS in a non-linking PLACE.

Nevertheless, we will argue in this chapter that the linking of resultative verbs is principled. Given how our Prohibition Against Double Fusion works, it will be impossible for a theme and a PLACE contained in the same BE(COME) clause to *both* link. And this is true not only for resultatives but also for a variety of verb classes, as we will show in the next chapter.

6.1 Deriving Resultative Mismatches from the Prohibition Against Double Fusion

We saw in Chapter 4, Section 2 how the Prohibition Against Double Fusion (PADF) in (1) constrains Adjunct Fusion rules, by preventing the CSs of two syntactic XPs from fusing with the same CS constituent, ruling out cases like (2b) and (3b).[1]

(1) **Prohibition Against Double Fusion**
Fusion cannot apply more than once to a CS constituent.

(2) a. The queen buttered her crumpet [with cheap margarine].
b. *The queen put [a buttery substance] on her crumpet [with cheap margarine].

---

[1] Recall that the Theta Criterion cannot apply to these cases because it constrains only XPs that correspond to arguments. See Chapter 4, Section 2, note 13.

J. Randall, *Linking: The Geometry of Argument Structure*, 173–201

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(3) a. Some shoppers bag their groceries [in biodegradable bags].
b. *Some shoppers put their groceries [in bags] [in biodegradable bags].

The PADF was also responsible for the ungrammaticality of cases like (4), which we looked at in Chapter 1, Section 3 and Chapter 4, Section 3.

(4) *[$_{\text{NP}}$ Fred] buys [$_{\text{NP}}$ supplies] [$_{\text{PP}}$ from Rob] [$_{\text{PP}}$ to himself].

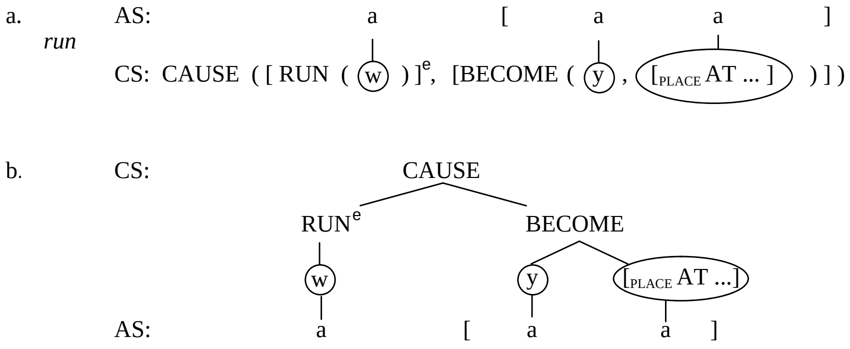
The problem was that when the CS of *Fred* fuses with the agent position, it fuses at the same time with the co-indexed goal position, making that position unavailable for the CS of the *to*-PP to fuse with.

(5) CAUSE ([$_{\text{THING}}$ FRED]$_{\text{i}}$, [BECOME ([$_{\text{THING}}$ SUPPLIES], NOT [$_{\text{PLACE}}$ AT [$_{\text{THING}}$ ROB]]]
[$_{\text{PLACE}}$ AT [$_{\text{THING}}$ FRED]$_{\text{i}}$])])

And we have just shown how our newly extended definition of fusion, Clausal Fusion, applies in the derivation of resultatives, in which an unlinked theme in the resultative verb's CS gets its interpretation via fusion of the result XP. We will now show that although it is stipulated that the theme in the output of RF does not link, things could not be otherwise, or a double fusion violation would result.

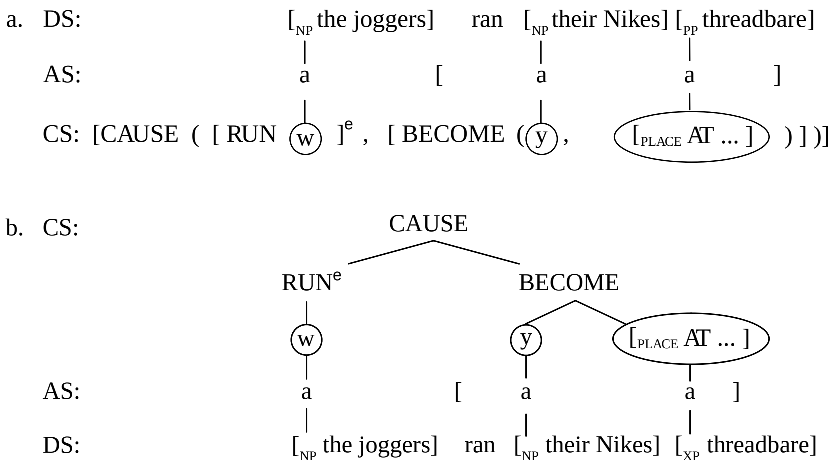
Consider a hypothetical alternative to RF, call it RF-2, in which both the theme **and** the PLACE linked to AS. If RF-2 applied to an intransitive verb like *run*, it would produce a resultative with *two* internal arguments, (6). (Both brackets and trees are used, for clarity.)

(6) Intransitive output of Hypothetical RF-2



Ignoring the rightmost internal argument for the moment, fusion would apply to (7) to produce the partial CS in (8), in which the CS for *their Nikes* has fused with y.

(7)

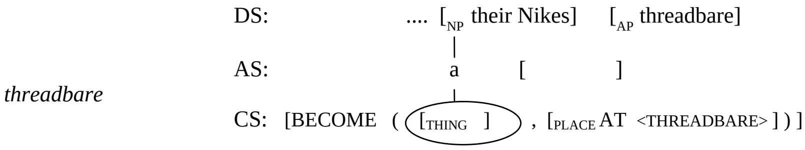

a.
DS: [NP the joggers] ran [NP their Nikes] [PP threadbare]
AS: a [a a]
CS: [CAUSE ([RUN (w)]e , [BECOME ((y), ([PLACE AT ...]))])]
b.
CS:
CAUSE
RUNe
BECOME
w
y
[PLACE AT ...]
AS: a [a a]
DS: [NP the joggers] ran [NP their Nikes] [XP threadbare]

(8) CS after fusion:

CAUSE ([RUN ([$_{\text{THING}}$ THE JOGGERS])]^{e} , [BECOME ([$_{\text{THING}}$ THEIR NIKES] , [$_{\text{PLACE}}$ AT [...]])])

To complete the fusion in (8), the CS of the result XP *threadbare*, (9), must be fused with it. But that CS, after fusion, will contain the CS of *their Nikes* fused with its theme position, as shown in (10):

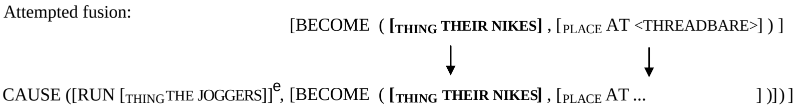
(9)


threadbare
DS: .... [NP their Nikes] [AP threadbare]
AS: a [ ]
CS: [BECOME ([THING] , [PLACE AT <THREADBARE>])]

(10) CS after fusion: [BECOME ([$_{\text{THING}}$ THEIR NIKES] , [$_{\text{PLACE}}$ AT <THREADBARE>])]

Then, (10) must fuse with the partial CS of the sentence in (8), lining up and merging with the BECOME clause, as shown in (11).

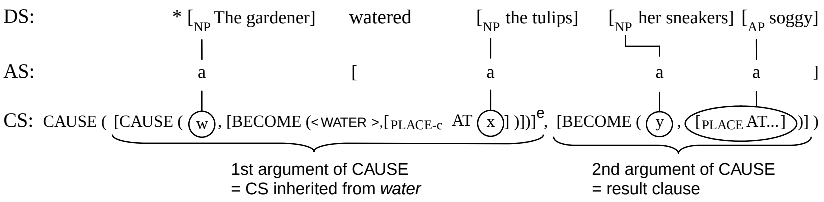
(11)


Attempted fusion:
[BECOME ([THING THEIR NIKES] , [PLACE AT <THREADBARE>])]
CAUSE ([RUN [THING THE JOGGERS]]e, [BECOME ([THING THEIR NIKES] , [PLACE AT ...])])]

But the derivation runs aground on the PADF. As shown in bold, ([$_{\text{THING}}$ THEIR NIKES] cannot fuse with the theme position in the result BECOME clause provided by the verb because that position is already occupied. A double fusion violation results.

A similar violation would arise with transitive resultatives. If RF-2 applied to a transitive verb like *water*, it would produce a resultative verb with one external and *three* internal arguments, (12).

(12)



Two of these arguments would link to THINGs in CS, x and y, each one corresponding to a postverbal NP in the syntax. The resulting sentence would mean: “the gardener’s watering the tulips caused her sneakers to become soggy.” The CS of the second postverbal NP (*her sneakers*) would fuse with the result theme (y) by virtue of satisfying the second internal argument postion in the AS of the verb. But it would also have fused with the theme in the CS of the result XP *soggy*, as its external argument. When the CS of the result AP *soggy* attempted to fuse with the CS of the verb, its theme would be blocked by the PADF from fusing with the already-occupied theme position in the verb. And an additional problem would arise: since there is no way for two postverbal NPs to receive case, the output would violate the case filter. So our alternative rule, RF-2, in which the theme and the PLACE both link, doesn’t work for either intransitive or transitive inputs.

Notice that under our actual RF rule, as we showed in Chapter 5, Section 4 for transitive resultatives the CS of the postverbal NP fuses twice into the resultative CS because it is an argument of both the verb and the result XP. But this fusion is with two distinct constituents in the resultative verb’s CS: with (x) in the inherited CS and with (y) in the result BECOME clause, so this does not constitute a case of “double fusion”. A similar situation obtains in depictive sentences like (13a). The CS of *the oysters* fuses twice in the CS of the sentence (13b), once with a constituent in the CS of the verb, x, and once with a constituent in the CS of the depictive predicate, y.

(13) a. She ate [the oysters] raw.

b. [CAUSE (w , [BECOME (x , [$_{\text{PLACE}}$ AT [<IN DIGESTIVE TRACT>]])],
[WHILE [BE (y , [$_{\text{PLACE}}$ AT <RAW>])]])]

And, again, no PADF violation obtains.

6.2 Independent Evidence for the Prohibition Against Double Fusion

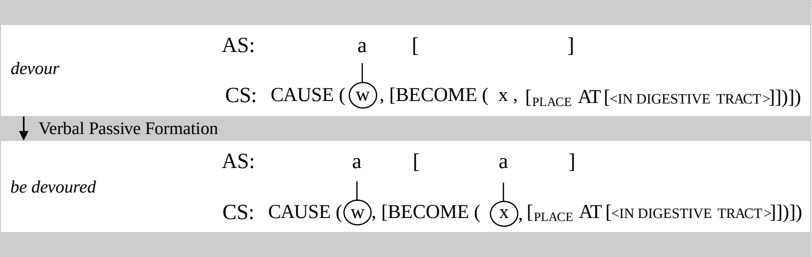
So far, we have shown how the Prohibition Against Double Fusion constrains several cases of adjunct fusion, where optional adjunct PPs fuse with the CSs of verbs (*buy*/*sell*, *put*), and we have seen it operate on arguments from different heads in Resultative Formation. We might now ask where else it comes into play.

6.2.1 *Passive* **by***-phrases and Agent Subjects*

In Chapter 4, Section 4, we claimed (following Jackendoff, 1990) that a passive verb like *(be) devoured* in (14b) is lexically derived from its active counterpart *devour* in (14a) by the rule of Verbal Passive Formation (VPF) in (15), which delinks the inherited agent, w, thereby causing the external AS position to disappear.

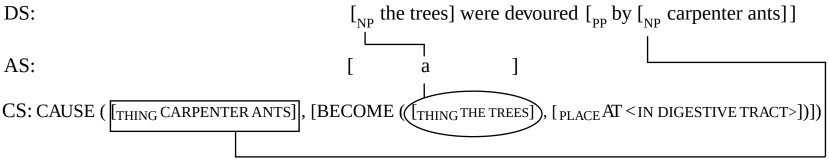
(14) a. The insects devoured the trees.
 b. The trees were devoured (by the insects).

(15)


devour
AS: a [ ]
CS: CAUSE (w, [BECOME (x , [PLACE AT [<IN DIGESTIVE TRACT>]])])
Verbal Passive Formation
be devoured
AS: a [a]
CS: CAUSE (w, [BECOME (x, [PLACE AT [<IN DIGESTIVE TRACT>]])])

The agent, w, is still present in the passive CS, though no longer linked to an AS position. When an optional *by*-phrase is added, a Passive *By*-Adjunct Rule (Jackendoff 1990) fuses the CS of the object of *by* with w.[2] This explains why *by*-phrase adjuncts – even though they are not arguments – must nevertheless obey the selectional restrictions on the agent in the verb's CS. After both argument fusion and adjunct fusion have applied, the output looks like (16):

(16)


DS: [NP the trees] were devoured [PP by [NP carpenter ants]]
AS: [a]
CS: CAUSE ([THING CARPENTER ANTS], [BECOME ([THING THE TREES], [PLACE AT <IN DIGESTIVE TRACT>])])

Now consider the two active sentences in (17).

(17) a. *[$_{\text{NP}}$ Insects] [$_{\text{NP}}$ carpenter ants] devoured the trees.
 b. *[$_{\text{NP}}$ Insects] devoured the trees [$_{\text{PP}}$ by carpenter ants].

---

[2] This rule is parallel to both the *With*-Theme Adjunct Rule and the PP Adjunct Rule in Chapter 4, Section 2, in fusing the CS of the adjunct directly with the CS of the verb, without involving AS.

Example (17a) is clearly ruled out by the Theta Criterion; two NPs are vying for the single external argument position in the AS of *devour*. However, the Theta Criterion does not block (17b): [$_{NP}$ insects] is an argument but [$_{PP}$ by carpenter ants] is an adjunct and the Theta Criterion applies only to arguments. The sentence will be blocked, though, by the Prohibition Against Double Fusion. The CS of *insects* fuses with the agent in the verb's CS by virtue of satisfying the external argument position. Because of the PADF, nothing else can fuse with this agent, regardless of its argument status. The Passive *By*-Adjunct Rule is blocked from applying.

6.2.2 **With-***Themes and Theme Direct Objects*

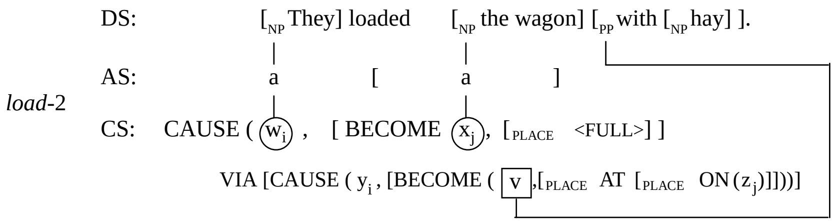
A similar situation arises with *spray-load* verbs, discussed in Chapter 4, Section 2.1.3, to which we assigned the two alternate argument structures and paraphrases in (18) and (19):

(18) load-1: They loaded hay onto the wagon.
'They caused hay to come to be on the wagon.'

(19) load-2: They loaded the wagon with hay.
'They caused the [wagon]$_j$ to become full
BY [causing hay to come to be on [it]$_j$.]'

And we claimed that (18) and (19) also have distinct CSs.[3] (19) has the CS in (20), with two arguments. *With hay* in (19) is an adjunct that fuses with the non-linking theme position, v, in the lower change-of-location clause VIA clause. Fusion of the *with*-PP is carried out by the *With*-Theme Adjunct Rule (see Chapter 4, Section 2), which creates a direct link between [$_{NP}$ hay] and v without the involvement of AS.

(20)


DS: [NP They] loaded [NP the wagon] [PP with [NP hay]].
AS: a [a]
load-2
CS: CAUSE (wi , [BECOME xj , [PLACE <FULL>]]
VIA [CAUSE (yi , [BECOME (v ,[PLACE AT [PLACE ON(zj)]]))]

The arguments [$_{NP}$ they] and [$_{NP}$ the wagon] fuse into w and x, and into the positions coindexed with them, y and z. Linking obeys the ILH – w is higher than x in both CS and AS – and it also obeys the Bound Argument Condition in (21), repeated from Chapter 4, (96).

---

[3] Jackendoff uses the *With*-Theme Adjunct Rule for (19), but claims that this variant has the change-of-location paraphrase in (18). He takes no stand on whether (18) has the same CS as (19).

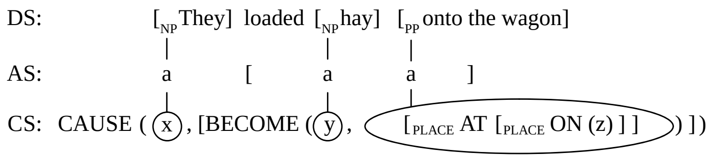
(21) **Bound Argument Condition**:
Given two bound CS arguments, only the higher one is eligible to link to an AS position.

In both pairs of coindexed arguments, it is the higher one that links. The CS output is shown in (22).

(22) CAUSE ([$_{\text{THING}}$THEY]$_i$, [BECOME [$_{\text{THING}}$THE WAGON]$_j$, [$_{\text{PLACE}}$FULL]]
VIA [CAUSE ([$_{\text{THING}}$ THEY]$_i$,[BECOME ([$_{\text{THING}}$ HAY], [$_{\text{PLACE}}$AT [$_{\text{PLACE}}$ ON ([$_{\text{THING}}$ THE WAGON]$_j$)]]]))]

The *With*-Theme Adjunct Rule, however, cannot apply to *load*-1 in (18) to create **They loaded hay onto the wagon with hay*. Our analysis in Chapter 4, Section 2 assigned this version of *load* three linking CS arguments, parallel to *put*, as shown in (23).

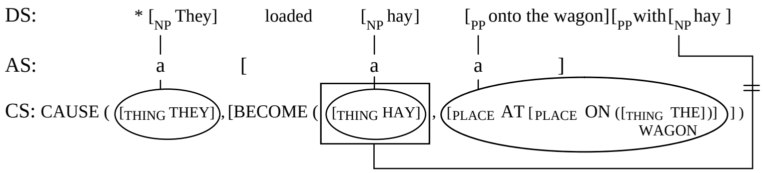
(23)



load-1
DS:
[$_{\text{NP}}$They] loaded [$_{\text{NP}}$hay] [$_{\text{PP}}$onto the wagon]
AS:
a [a a]
CS: CAUSE (x , [BECOME (y , [$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ ON (z)]])])

When fusion applies, the CS of *hay* fuses with the theme, y, by virtue of being an internal argument of the verb. But the PADF prevents *with hay* from fusing with the same theme position via the *With*-Theme Adjunct Rule, as shown in (24).[4]

(24)



load-1
DS:
* [$_{\text{NP}}$ They] loaded [$_{\text{NP}}$ hay] [$_{\text{PP}}$onto the wagon][$_{\text{PP}}$with[$_{\text{NP}}$hay]
AS:
a [a a]
CS: CAUSE (([$_{\text{THING}}$ THEY]), [BECOME (([$_{\text{THING}}$ HAY]) , ([$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ ON ([$_{\text{THING}}$ THE WAGON])])])

In fact, this is not our final analysis of change-of-location *load*. Clausal Fusion forces a reanalysis of many verbs, which we begin in the next chapter with *put*, and extend to *load*-1 in Chapter 9. Rather than preview that analysis here, we will just note that it will similarly block the *With*-Theme Adjunct Rule from creating the DS in (24): *with hay* cannot fuse with the already linked theme position because it would cause a double fusion violation.

---

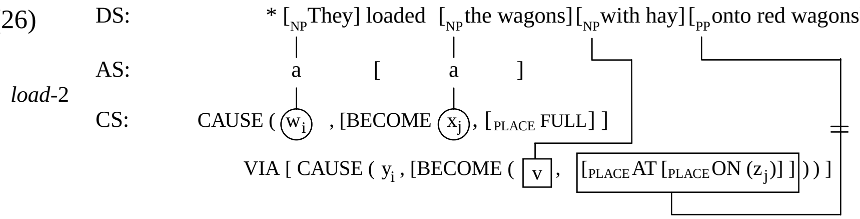
[4] Our analysis, giving the two *load*s different CSs, allows for a second explanation of the ungrammaticality of (24). We could reformulate the *With*-Theme Adjunct Rule to apply only to *with*-themes embedded under means clauses headed by VIA. Note that this would not be possible under Jackendoff's analysis, in which the theme in the grammatical (19) is not embedded under VIA.

6.2.3 *PP Locations and Locative Direct Objects*

By the same token, the PADF explains the ungrammaticality of sentences like (25a), with the intended meaning in (25b), based on (19) with a direct object location but with a second location in a PP adjunct, as in (26).

(25) a. *They loaded *the wagons* with hay *onto red wagons*
b. 'They caused the wagons to become full BY [causing hay to come to be on red wagons]'

(26)


DS:
* [$_{NP}$They] loaded [$_{NP}$the wagons] [$_{NP}$with hay] [$_{PP}$onto red wagons]
AS:
a [a]
load-2
CS:
CAUSE (w_i , [BECOME x_j , [$_{PLACE}$ FULL]]
VIA [CAUSE (y_i , [BECOME (v , [$_{PLACE}$ AT [$_{PLACE}$ ON (z_j)]]))]

It might appear that the CSs of *the wagons* and *red wagons* in (26) could each fuse with a different constituent in the CS, one with x in the higher clause, the other with z in the lower clause, so (25) might not appear to violate the PADF. However, x and z are coindexed, so the CS of *the wagons* fuses with x_j via argument fusion and, at the same time, with z_j.[5] The PP-Adjunct Rule cannot also fuse the CS of *onto red wagons* with the PLACE containing z_j without causing a PADF violation.

6.2.4 *The Prohibition Against Double Fusion Versus Jackendoff's (1990) Constraints on Adjunct Rules*

In concluding our discussion of the PADF, we should contrast it with Jackendoff's (1990) system, which does not have such a principle, but which also must prevent double fusion. He does this for each adjunct rule separately, restricting it from fusing the CS of the adjunct with a CS constituent already specified as linking to AS. For example, his *With*-Theme Adjunct Rule stipulates that it cannot fuse the object of a *with*-PP with the theme of a verb if that theme links. The ungrammatical representation in (24) is not generated, because the *With*-Theme Adjunct Rule will not fuse anything with the circled (linking) theme of *load*-1.

While these combined constraints have the same effect as the PADF – each adjunct rule independently specifies that it can fuse material only with an implicit (or non-linked) CS argument – we feel that this way of doing things misses a generalization. In his framework, there *could* be an adjunct rule that fuses material with a CS constituent that links to AS. But this is never the case.

---

[5] Notice that even if *onto red wagons* were an argument it would fail to link, since according to the Bound Argument Condition, in (21) above, only one of two co-indexed CS arguments can link.

Furthermore, we believe that the scope of the phenomenon is broader. Our PADF blocks the fusion of arguments as well as adjuncts. And though it is hard to find potential cases where two arguments compete to fuse with a single CS constituent, due to the effects of the Theta Criterion, we have seen a relevant case in resultatives. The resultative verb and its result argument have overlapping CS domains, but the theme in the CS of the result BECOME clause does not link, which prevents the fusion of two arguments with a single CS constituent. In short, we prefer our Prohibition Against Double Fusion to Jackendoff's constrained adjunct rule approach because it handles the entire range of adjuncts with one principle and because it generalizes to arguments as well as adjuncts.

In sum, it is not an accident that the result theme does not link in the output of RF. If it did, then the outputs of RF would all trigger violations of the PADF, a constraint that is motivated independently of resultatives. This is our answer to the second question posed at the end of Chapter 5, Section 3: *Is it a quirk of RF that it introduces a non-linking implicit theme, or does this follow from something more general?* In the next chapter we will see more examples of the PADF at work.

6.3 The Prohibition Against Double Fusion and the Theta Criterion

In the course of this book, we have used the Theta Criterion to constrain the mapping of CS arguments to the syntax. But we have also adopted the Prohibition Against Double Fusion, which applies not only to limit Adjunct Fusion but also Argument Fusion, so it may appear that this Prohibition duplicates the work done by the Theta Criterion. In this section we will show that this is not the case, rather that they work in the theory in a complementary way.

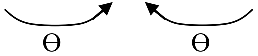
In Chapter 1 we dropped the traditional statement of the Theta Criterion (Chomsky 1986:184) in (27) in favor of a "relativized" Theta Criterion, (28) (following Schein, 1982; Emonds, 1985; Rapoport, 1986; and Samek-Lodovici, 2003), which determines the mapping between theta roles and syntactic XPs relative to lexical heads, as highlighted in bold. Thus, each head has its own argument structure and set of associated theta roles. An XP can receive only one role from each head. But if the XP is simultaneously an argument of more than one head, it receives a theta role from each one. (In fact (28) is more stringent than earlier relativized versions: in clause (a), *must* is used rather than *may,* as argued for in Chapter 4, Section 5.)

(27) **Theta Criterion** (traditional formulation)
- a. Each argument is assigned its theta role in exactly one theta position (namely, at D-Structure)
- b. Each assignable theta role must be assigned to an argument

(28) **Theta Criterion** (relativized formulation)
Within the argument structure of a predicate,
a. each argument *must* thematically license one and only one syntactic constituent and
b. a syntactic constituent may saturate one and only one argument

One case that required the relativized formulation was transitive resultatives, in (29), as we saw in Chapter 5, Section 2. The postverbal NP (*the tulips*) is simultaneously an internal argument of the resultative verb (inherited from the input verb, non-resultative *water*), and the external argument of the head of the AP predicate, *flat*.

(29) [$_{\text{NP}}$The gardener] watered [$_{\text{NP}}$ the tulips] [$_{\text{AP}}$ flat]



The Theta Criterion in (28) is stated as a relation between theta roles and XPs at D-Structure but only those theta roles that are **arguments** of a head, just those thematic elements in a head's CS that are designated to link. Each of these, in our system, is represented as projecting to the AS of the head, which is a list of arguments, each one corresponding to an XP in the syntax. But there were two potential problems for this one-to-one mapping, even relativized to heads.

First, there are verbs that assign two theta roles to one XP, for example, *buy* and *sell*, and reflexive and reciprocal verbs like *wash* (*The mechanic washed*) and *fight* (*The armies fought*). These violate clause (b) of (28), since one NP corresponds to two (co-indexed) elements in the CS of these verbs. We solved this problem with the Bound Argument Condition, which "counts" two coindexed CS elements as one, and specifies that it is the higher of the two that links.

(30) **Bound Argument Condition:**
Given two bound CS arguments, only the higher one is eligible to link to an AS position.

A second kind of problem arose in connection with adjuncts. We saw that when an adjunct duplicates a non-linking theta role, such as the "implicit" theme or PLACE constituent in *butter* and *bag*, or the implicit agent in passives, the output is grammatical, as (31) shows.[6]

(31) a. The queen buttered her crumpet *with cheap margarine*.
b. Some shoppers bag their groceries *in recycled bags*.
c. The trees were devoured *by carpenter ants*.

These cases correctly escape the jaws of the Theta Criterion, which applies only to arguments. But for the same reason, the Theta Criterion could not rule out the ungrammatical cases in (32).

---

[6] Provided that the adjunct does not merely repeat the content of the implicit argument (**The queen buttered her crumpet with butter*).

(32) a. *The queen put [a buttery substance] on her crumpet [with cheap margarine].
b. *Some shoppers put their groceries [in bags] [in recycled bags].
c. *[Insects] devoured the trees [by carpenter ants].

Even though one instance of each theta role **is** expressed by an argument, the second instance is supplied by an adjunct, so the Theta Criterion cannot apply.

To block these cases, we introduced the Prohibition Against Double Fusion, (33).

(33) **Prohibition Against Double Fusion**
Fusion cannot apply more than once to a CS constituent.

Now, when the CSs of the adjuncts try to fuse with the CSs of the verbs, they will be blocked, because the positions in CS that they would fuse with are already occupied by the CSs of the verb's arguments.

Of course, it might be theoretically more elegant if we could eliminate one of these and have its effects follow from the other. Suppose we eliminate the PADF and allow the Theta Criterion to apply not only to arguments but also to adjuncts. In fact, this is what the "classic" Theta Criterion did. No mention is made in (27) of arguments. One theta role – whether it corresponds to an argument or adjunct – cannot be expressed by two XPs in the syntax. But while this theoretical economy is desirable, it would imply a different picture of what lexical entries include. Not only would this more powerful Theta Criterion correctly rule out the "selected" adjuncts in (32) that fuse with the CSs of specific verbs, it would also have to rule out what we have called (in Chapter 4, Section 2.3.2) "peripheral" adjuncts, which do not relate to particular verbs but are added to the larger CS that the verb and its arguments are a part of. Manner adjuncts, for example, are not s-selected by every verb that allows them, yet something has to prevent two of them from showing up in the same VP:

(34) *Seymour sliced the salami [with a tempered steel blade] [with a knife]

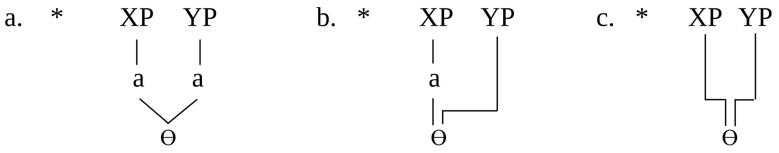
We certainly want (34) to be ruled out. But by the Theta Criterion?

In our system, the Theta Criterion is a lexical principle tied to the lexical features of heads. It legislates only over those theta roles that are selected as arguments of a head, that is, those theta roles that are internal to the CSs of particular lexical items. The PADF, in contrast, is a general principle that applies to sentential representations, in which the CSs of heads are compositionally combined. Thus the Theta Criterion is a local constraint, while the PADF operates globally. This division of labor reflects the way that meanings are built up. And for this reason, it does not make sense for the Theta Criterion to expand its domain to include adjuncts.

But if we do not want the Theta Criterion to assume the job of the PADF, perhaps the PADF is all that we need. Does it do the work of the Theta Criterion? The PADF prohibits two syntactic XPs from fusing with the same element in CS (or with two coindexed elements, as discussed above), whether the XPs are two arguments, an argument and an adjunct, or two adjuncts, as pictured in (35).

In contrast, our Theta Criterion, repeated in (36), is a relation between the syntax and just arguments (those CS elements that link).

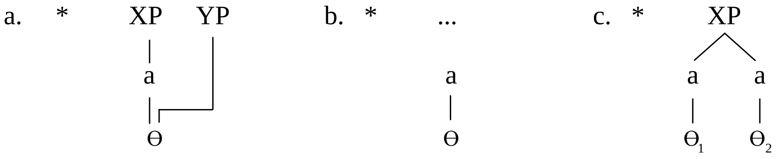
(35) Prohibition Against Double Fusion Violations



(36) **The Theta Criterion**
Within the argument structure of a predicate,
a. each argument must thematically license one and only one syntactic constituent and
b. a syntactic constituent may saturate one and only one argument

Clause (a) prevents a single argument from corresponding to two syntactic constituents, as in (37a), which corresponds to the PADF configuration in (35b). But clause (a) also requires that there be an XP for each linking argument, ruling out (37b), something that the PADF does not require. If there were a CS argument that were not expressed in the syntax, the Theta Criterion, not the PADF, would be violated. So clause (a) is not subsumed by the PADF.

(37) Theta Criterion Violations

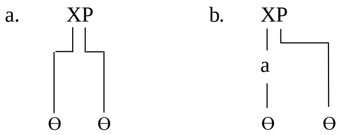


And the PADF has nothing at all to say about clause (b), which rules out (37c). The PADF cannot prevent one syntactic constituent from fusing with two different linking CS elements. For example, the agent and theme of a verb cannot both link to the same XP. **The mechanic hurt*, with the meaning “the mechanic hurt himself” is ungrammatical, but only by the Theta Criterion, not the PADF. So the Theta Criterion is not subsumed by the PADF.[7]

---

[7] It is an open question whether an additional principle is needed since even with the PADF and the Theta Criterion, our system cannot rule out a correspondence between (a) one XP and two non-linking CS elements or (b) a single XP and two CS elements, one linking and one non-linking CS (an implicit or incorporated argument):

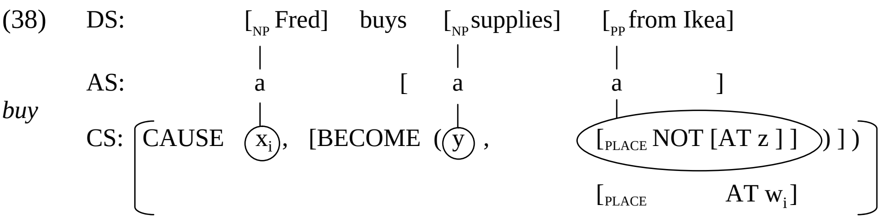
(i)



In sum, we need both the Theta Criterion and the PADF. The two principles operate in different domains. The Theta Criterion is specifically designed to regulate the mapping of arguments of a head. To the extent that it is valid to draw a distinction between arguments and non-arguments, having a principle that holds of one of these types and not the other seems reasonable. The PADF holds more globally to regulate how sentences are composed, and it happens to overlap with the Theta Criterion in one small way. But this is only because arguments are one type in the large inventory of element types that make up sentences. For the rest, the two principles operate independently, and are independently needed.

There is one question that we should address before moving on. One might now ask whether with the addition of the PADF, we actually still need the Bound Argument Condition, (30), above. In our system, when fusion occurs it operates on all co-indexed CS elements. So in the CS of *buy* in (38), *Fred* fuses with both x_i and w_i, even though only x_i is circled to link:

(38)

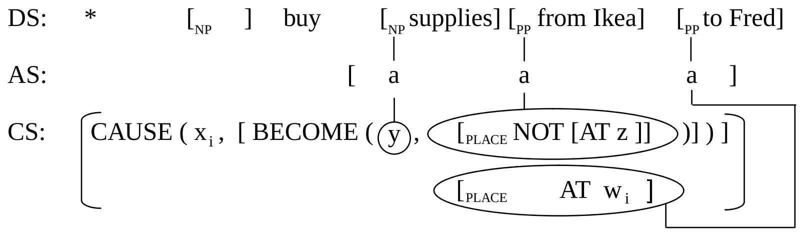


Given this, the PADF by itself would rule out adding a PP (either an argument or an adjunct PP) that would fuse with w_i (for example *to Fred* or *to himself*). The Bound Argument Condition is also not necessary to determine linking; in our system CS elements are marked as linking or not. But what the Bound Argument Condition **does** do that the PADF does not is express the generalization that when there are two coindexed elements, it is the higher one that links. As we saw in Chapter 4, Section 3, linking w_i would produce an unaccusative version of *buy*, which English does not have; **Supplies buy from Ikea to Fred* is ungrammatical:[8]

In addition, the situations in which two CS elements do correspond to one XP are only those permitted by co-indexing (and governed by the Bound Argument Condition), and they fall under the rules for reciprocals and reflexives. We are not proposing a principle that would predict under what conditions two CS arguments can be coindexed. But whatever principle governs this mapping, it will have to predict that while coindexing allows *the mechanic washed* it does not permit **the mechanic hurt*. We leave this as a question for future research.

[8] However, other languages may have this option. As mentioned earlier, implicit object reflexives (*the mechanic washed*) and reciprocals (*the armies fought*) appear to be unergative in English, showing that the higher of the two coindexed elements links, but they have the markings of unaccusativity in Romance.

(39)

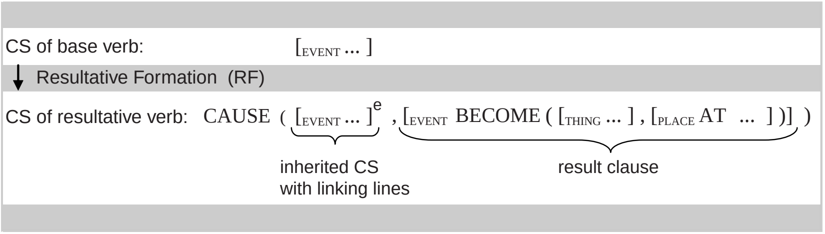

DS: * [NP] buy [NP supplies] [PP from Ikea] [PP to Fred]
AS: [a a a]
CS: CAUSE (xi , [BECOME (y , [PLACE NOT [AT z]])])]
[PLACE AT wi]

So the Bound Argument Condition cannot be subsumed under either the Theta Criterion or the PADF.

6.4 Against an Alternative CS for Resultatives: The Means Analysis (Jackendoff, 1990)

We claimed that our proposed rule of Resultative Formation, repeated from Chapter 5, (23), as (40), reflects the correct CS for resultative verbs.

(40)


CS of base verb: [EVENT ...]
Resultative Formation (RF)
CS of resultative verb: CAUSE ([EVENT ...]e , [EVENT BECOME ([THING ...] , [PLACE AT ...])])
inherited CS with linking lines
result clause

Before leaving this chapter, we will discuss an alternative CS for resultatives proposed by Jackendoff (1990:235–241). Although his analysis is one among many,[9] it is an interesting competitor since it uses the same framework and so is directly comparable to ours. Moreover, it attempts to refute an early (unpublished) version of our claims (cited by Jackendoff as Carrier & Randall, forthcoming), a refutation which we will now answer.

Jackendoff argues for a “Means Analysis” as in contrast to our “Agent Analysis”, labels whose meanings will become apparent shortly. We will show, first, that the two arguments he gives for his Means Analysis do not go through. We will then review two arguments that favor our Agent Analysis and show that his responses to these arguments, aimed at buttressing his Means Analysis, actually get it into serious trouble.

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[9] “Small-clause” analyses go back to Kayne (1985), van Voorst (1986), Hoekstra (1988); “complex-verb” analyses include Larson (1988, 1990). Both types are critiqued in Carrier & Randall (1992). See also Goldberg (1992), Bowers (1997), Rappaport, Hovav & Levin (1998a, 2001), Snyder (2001), van den Wyngaerd (2001), Boas (2003), Goldberg & Jackendoff (2004), and Kratzer (2005), among others.

Jackendoff's Means Analysis, shown in (41), shares several features with our Agent Analysis.

(41)

CS of base verb: [...]

↓ "Means" RF

CS of resultative verb: $\text{CAUSE}\ ([_{\text{THING}}\ ],\ [\text{BECOME}\ ([_{\text{THING}}\ ],\ [_{\text{PLACE}}\ ])\ \text{BY}\ \underbrace{[\ \dots\ ]}_{\text{CS inherited from base verb}})$

First, both contain the skeletal representation in (42), according to which the meaning of resultatives involves causing or bringing about a resultant change of state.

(42) $\text{CAUSE}\ ([\quad],\ [\ \text{BECOME}\ ([_{\text{THING}}\ ],\ [_{\text{PLACE}}\ ])\ ]\ )$

Second, for both, the CS of the resultative contains the CS of the base verb.

But the analyses differ with respect to *where* the inherited CS is subordinated within the resultative CS. For the Agent Analysis, it is embedded as the first argument of CAUSE, the agent argument. It is the gardener's watering the tulips that gets them flat. Under the Means Analysis, the first argument of CAUSE is a $[_{\text{THING}}]$, construed with the surface subject NP. It is the gardener that causes the tulips to become flat. The inherited CS is embedded under the primitive function BY, which expresses means.[10]

The difference between the two analyses shows up clearly in paraphrases of the meanings that they each attribute to our standard transitive and intransitive resultative sentences, in (43) and (44).[11]

(43) The gardener watered the tulips flat.
Agent: [The gardener's watering the tulips] made them flat.
Means: [The gardener]$_i$ made [the tulips]$_j$ flat by ([his]$_i$) watering [them]$_j$.

---

[10] There are two other differences. One is the "extent" interpretation, indicated by the superscript "e" on the output of the Agent Analysis. We will ignore it here. The second, which is not relevant here, is that for the Means Analysis the result AP is an adjunct, not an argument, and the Means CS in (41) is actually supplied by an adjunct rule that incorporates result adjuncts into the CS for the entire clause. Since the adjunct/argument choice is not important here, we will continue to treat the result XP as an argument and therefore will specify the Means CS as part of a *lexical* rule of RF.

[11] Notice that the Means Analysis coindexes each THING in the inherited CS clause embedded under BY with a constituent in the higher clause, indicated in (43) and (44) with subscripted coindexes. Jackendoff's (1990:231) means rule of RF is formulated to coindex the correct variables.

(44) The joggers ran their sneakers threadbare.
Agent: [The joggers' running] made their sneakers threadbare.
Means: [The joggers]$_i$ made their sneakers threadbare by ([their]$_i$) running.

In the sections that follow, we will first examine two of Jackendoff's arguments in favor of the Means analysis over the Agent analysis and show that they are seriously flawed. Following these are two arguments in favor of the Agent analysis. The conclusions support assigning our Agent Analysis to resultatives.

6.4.1 Jackendoff's First Argument for the Means Analysis and a Refutation: The Actor Test

Jackendoff's first argument for his Means Analysis is that the syntactic subject NP of a resultative verb (*the gardener; the joggers*) is an agent relative to the highest CAUSE in the verb's CS, and that this is only the case under the Means Analysis. Our Agent Analysis claims that the surface subject NP bears no direct role relative to the highest CAUSE, since its theta role is embedded *inside* the first argument of CAUSE. Now, Jackendoff's diagnostic for agenthood – the pseudocleft test – does not actually bear on this thematic role directly. It is a test for an NP's role in a distinct CS level that Jackendoff postulates, the "action tier". To examine his first argument then, we must digress briefly to discuss this tier.

The CS representations that we adapted from Jackendoff are representations on his "thematic tier". This tier contains primitives such as CAUSE, BE(COME), THING, PLACE, and AT, and expresses thematic relations such as agent, theme, source, goal, and location.[12] But his system also includes a second tier of CS, the "action tier", which is autonomous from, but linked to, the thematic tier. The action tier consists of a primitive function AFFECT (abbreviated AFF) and its arguments: actor, the entity that acts, and patient, the entity acted upon. Each of the arguments of AFF is usually linked to an argument in the thematic tier.[13] In (45) is the two-tiered CS entry for the non-resultative causative sentence *The gardener watered the tulips*.[14]

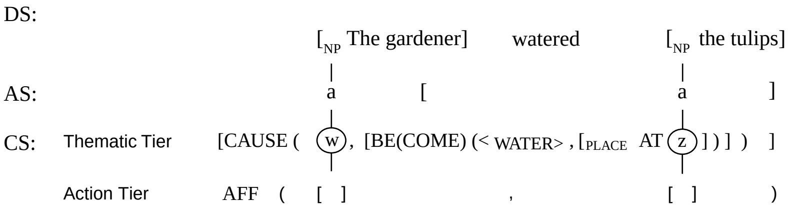
---

[12] In fact, rather than BE(COME) Jackendoff's primitive is labelled INCHoative BE.

[13] As discussed by Jackendoff, actor and patient roles can also be provided by pragmatics or the discourse context, as well as by the lexical entry.

[14] Jackendoff actually links CS to AS from the AFF tier, wherever possible, linking from the thematic tier only when there are thematic roles which are neither patient nor actor, as is the case, for example, with *receive*. We do not include an action tier in our CS representations, so all CS – AS linking is directly from the thematic tier. This is a difference between our account and Jackendoff's that is not relevant to the present discussion.

(45)


DS:
[NP The gardener] watered [NP the tulips]
AS:
a [a]
CS:
Thematic Tier
[CAUSE (w , [BE(COME) (< WATER> , [PLACE AT z])])]
Action Tier
AFF ([ ] , [ ])

For ordinary causative sentences like this one, the actor on the action tier is linked to the agent (the first argument of CAUSE) on the thematic tier. Given this, to test whether the subject NP of the resultative sentence is an agent, Jackendoff feels justified using a test that identifies an NP as an actor. If the NP passes the test in this causative sentence, he concludes that it is both an actor and an agent.

The Actor Test inserts the NP into the pseudocleft construction in (46). The entire sentence is inserted after the copula, with an appropriate pronoun substituted for the repeated NP.[15]

(46) Actor Test: What [NP] did was ____.

If we test *the gardener* in (45), the Actor Test will produce (47), indicating that this NP is an actor on the action tier and an agent on the thematic tier.[16,17]

(47) What [the gardener] did was [he] watered the tulips.

---

[15] A second way to apply the test is to place only the V' rather than the entire clause in the dash after the copula. This produces (i).

(i) What the gardener did was water the tulips.

We will stick to the first version in our discussion, since that is the one that Jackendoff uses.

[16] Note that actors are not always agents: they can be theme (i), source (ii), or goal (iii) depending on the verb (examples adapted from Jackendoff, 1990:126).

(i)	The rock rolled down the hill.	What [the rock] did was [it] rolled down the hill.
(ii)	The sodium emitted electrons.	What [the sodium] did was [it] emitted electrons.
(iii)	The sponge absorbed the water.	What [the sponge] did was [it] absorbed the water.

[17] There is also a Patient Test, which also has two versions: an NP bears the patient role if it can substitute for [NP] in *either* (ia) or (ib).

(i) a. What NP did to [NP] was ___.
b. What happened to [NP] was ___.

According to these tests, *the tulips* in (48) is the patient on the action tier (in addition to being the goal on the thematic tier):

(ii) a. What the gardener did to [the tulips] was water [them] / he watered [them.]
b. What happened to [the tulips] was the gardener watered [them].

Now, before we see how Jackendoff uses the Actor Test to choose the Means Analysis over the Agent Analysis, we wish to point out one thing. In choosing between the two analyses, we are choosing only between two competing *thematic* tiers. The fact that Jackendoff supplements his thematic tier with an action tier is not really relevant; an action tier could be added to our Agent Analysis should we find it necessary. We are only bringing the action tier into the discussion because Jackendoff uses a test for a role on *that* tier to make a claim about the role of an NP on the thematic tier.

Jackendoff applies the Actor Test to our stock transitive resultative sentence, to its paraphrase according to the Means Analysis, and to its paraphrase according to the Agent Analysis, in (48a–c). The test yields (49), (50), and (51), respectively.

(48) a. Resultative: The gardener watered the tulips flat.
b. Means Paraphrase: [The gardener]$_i$ made [the tulips]$_j$ flat by ([his]$_i$) watering [them]$_j$.
c. Agent Paraphrase: [The gardener's watering the tulips] made them flat.

(49) The Actor Test applied to the resultative sentence:
What [the gardener] did to the tulips was [he] watered them flat.

(50) The Actor Test applied to the Means Paraphrase:
What [the gardener] did to the tulips was [he] made them flat by watering them.

(51) The Actor Test applied to the Agent Paraphrase:
a. ??What [the gardener] did to the tulips was [his watering them] made them flat.
b. What [the gardener's watering the tulips] did to them was [it] made them flat.

Based on these results, he concludes that the Means Analysis is correct. He reasons that the test shows that *the gardener* is an actor – and therefore also an agent – in both the resultative sentence and the Means Paraphrase. In (51a), the first of two possible Agent Paraphrases, *the gardener* fails the Actor Test, so it is not an actor or an agent, and in (51b), the second possible Agent Paraphrase, an event – not the gardener – is the actor and agent.

There are problems with this logic, however. First, the pseudoclefted resultative in (49) is consistent with the Agent Analysis as well as the Means Analysis. Second, the way that Jackendoff applies the Actor Test to the Agent Paraphrase in (51a) violates a syntactic condition on pseudoclefts, and this is what makes the output ungrammatical. Once the condition is obeyed, the Agent Paraphrase passes the test. Finally, we do not agree with Jackendoff that testing paraphrases is a reliable way to determine the CS of the resultative itself. We will address these points in turn.

First, consider (49), which showed that *the gardener* in the resultative sentence, (48a), is an Actor – and an agent – in the CS for the resultative. Under the Means

CS, in (52), *the gardener* is indeed an agent, as the first argument of the highest CAUSE. So the Means Analysis is possible.

(52) The Means CS for (48a) *The gardener watered the tulips flat*

$$[\text{CAUSE}(\,[_{\text{THING}}\ \text{THE GARDENER}]\,, [\text{BECOME}([_{\text{THING}}\ \text{THE TULIPS}],\ [_{\text{PLACE}}\ \text{AT FLAT}]\,)\,]$$

$$\text{BY}(\ \underbrace{[\text{CAUSE}([_{\text{THING}}\ \text{THE GARDENER}],\ [\text{BECOME}([_{\text{THING}}\ \text{WATER}],[_{\text{PLACE}}\ \text{AT}\,[_{\text{THING}}\ \text{THE TULIPS}\,]\,]\,)]\,)]}_{\text{inherited CS of base verb } \textit{water}}\,)]$$

In the Agent Analysis CS, recall that there are two agents, as shown in (53). The agent of the highest CAUSE, "Agent-2", is built up from the CS inherited from the base verb. Inside this agent is another agent, "Agent-1", which corresponds to *the gardener*.

(53) The Agent CS for (48a) *The gardener* ***water****ed the tulips flat*

$$[\text{CAUSE}$$

$$\underbrace{([\text{CAUSE}(\,\underbrace{[_{\text{THING}}\ \text{THE GARDENER}]}_{\text{Agent-1}},\ [\text{BECOME}([_{\text{THING}}\ \text{WATER}],[_{\text{PLACE}}\ \text{AT}\,[_{\text{THING}}\ \text{THE TULIPS}\,]\,])]^{e},}_{\text{Agent-2 = inherited CS from non-resultative } \textit{water}}$$

$$[\text{BECOME}(y\,,[_{\text{PLACE}}\ \text{AT FLAT}\ ]\,)\,]\,)\ ]$$

So the Agent Analysis also assigns *the gardener* an agent role in the CS of the resultative verb, even if it is not the only agent of that verb. Thus the Agent Analysis is also possible. So (49) by itself does not enable us to choose between the Means and Agent analyses.

Now, if the gardener counts as an agent in the Agent Analysis, then why isn't (51a) as good as (50)? The answer is that the Actor Test is not being properly applied to this sentence. Recall the Actor Test in (46) and the Agent Paraphrase in (48c) repeated here:

(46) Actor Test: What [NP] did was ____.

(48c) Agent Paraphrase: [The gardener's watering the tulips] made them flat.

To see if the gardener is an agent in the Agent Analysis CS, Jackendoff applies the Actor Test to the Agent Paraphrase to yield (51a) (repeated here):

(51) The Actor Test applied to the Agent Paraphrase:
a. ??What [the gardener] did to the tulips was [his watering them] made them flat.

However, for the Actor Test to succeed, the resumptive pronoun subject in the underlined main clause of the Actor Test sentence must agree with the subject NP being tested. The problem with (51a) is that [his watering them] does not agree with [the gardener]. If we correct this problem and apply the test again as in either (54a) or (54b), *the gardener* passes.

(54) a. What [the gardener] did was [he] watered the tulips and that made them flat.
b. What [the gardener] did was [he] watered the tulips, which made them flat.

These grammatical outputs come from using two slightly different paraphrases of the Agent CS, given in (55).

(55) a. The gardener watered the tulips and that made them flat.
b. The gardener watered the tulips, which made them flat.

And though different from Jackendoff's Agent Paraphrase, (48c), these are no less defensible in capturing the claim of the Agent Analysis: it is the gardener's watering the tulips that made them flat. So like the Means Analysis, the Agent Analysis also supplies an agent in the CS of the resultative.

There is additional evidence that the ungrammatical Actor Test result in (51) comes from a syntactic problem with the pseudocleft construction. Notice that in a passive like (56a), the actor in the *by*-phrase fails the Actor Test, as shown in (56b).

(56) a. The suspects were interrogated by [the FBI agents].
b. *What [the FBI agents] did was the suspects were interrogated by [them].

The problem is that, as we claimed above, for the Actor Test to work, the NP being tested must agree with the subject of the main clause of the pseudocleft sentence. The failure of [the FBI agents] to pass the Actor Test should not be used to claim that it is not an actor.

Finally, there is the more general question of how valid it is to use the Actor Test on two paraphrases, (48b) and (48c), as a way to verify the correct CS for the resultative in (48a). We have just seen that different syntactic paraphrases of a given CS – (48c), (55a) and (55b) – yield different results on the Actor Test, because this test is sensitive to the syntax of its input. This variation suggests that it is just not a legitimate exercise to test a *paraphrase* of a given CS to verify the contents of that CS. What we can say is that if a given NP passes the Actor Test then it is plausibly an agent but if it fails the Actor Test its agenthood is not ruled out.

In sum, Jackendoff's Means Analysis and our Agent Analysis are still equal contenders as the CS for (48). The results of the Actor Test do not rule out either one.

6.4.2 *Jackendoff's Second Argument for the Means Analysis and a Refutation: "X's Way"*

Jackendoff's second argument for the Means Analysis represents resultatives as parallel to the "X's way" construction, illustrated in (57a), and to sentences such as (58a), where a manner-of-motion verb is extended into a change-of-location verb.

(57) a. Bill belched his way out of the restaurant.
b. paraphrase: Bill came to be out of the restaurant BY belching.

(58) a. Willy wiggled into Harriet's arms.
b. paraphrase: Willy came to be in Harriet's arms BY wiggling.

Jackendoff claims, correctly we believe, that (57a) and (58a) have Means CSs, paraphrased in their (b) counterparts. That is, they primarily express a change of location, with the CS of the basic verb embedded under the subordinating function BY. He argues that if we attribute a Means CS to resultatives as well, we can restrict the range of CS configurations allowed by the theory.

But in the theory of conceptual structure spelled out so far, there is nothing principled to rule out constructions in which inherited CSs are embedded inside an agent. Why should it be possible to embed an inherited CS under BY but not as the first argument of CAUSE? In fact, it is necessary to have CS clauses inside agents independent of resultatives. Any sentence with a gerund subject does, for example, the Agent Paraphrase sentence in (48c), (59a) containing *render* (from Chapter 5, Section 1, footnote 4) and a paraphrase of that sentence, (59b), with the verb *cause*.

(59) a. [The gardener's watering the tulips too forcefully] rendered them unfit for floral arrangements.
b. [The gardener's watering the tulips too forcefully] caused them to come to be unfit for floral arrangements.

So we do not find Jackendoff's second argument compelling. We stress that we are not claiming that the Means CS does not exist. We believe that (57a) and (58a) both require it, as do other sentences, as we will argue in Chapter 8, Section 5. However, the Agent CS is also possible and attested. Thus, there can be no *a priori* arguments against assigning it to resultatives.

6.4.3 *One Argument in Favor of the Agent Analysis: Unaccusative Verbs*

Our first argument in favor of our Agent Analysis has to do with resultatives based on unaccusative verbs, like those in (60).

(60) a. The rocks rolled smooth.
b. The toast burned black.

The unaccusative verbs underlying these resultatives, in (61), have a single argument, which is not an agent. This means that there is no agent in the inherited CS.

(61) a. The rocks rolled.
b. The toast burned.

This poses no problem for the Agent Analysis, since it is the entire inherited CS that brings about the resultant state. As paraphrased in (62a), the rock's rolling – not the rock – is the agent of the resultative sentence (60a). The Means Analysis, on the other hand, is in trouble. It would assign this sentence the meaning in (62b), which is clearly incorrect.

(62) a. Agent Analysis Paraphrase:
The rocks' rolling caused them to come to be smooth.
b. Means Analysis Paraphrase:
The rocks caused themselves to come to be smooth BY rolling.

To avoid this problem, Jackendoff is forced to claim that resultatives from unaccusative – agentless – verbs have a different CS from resultatives derived from agentive verbs. (60a) is not paraphrased as in (62b) but rather as in (63).

(63) Second Means Paraphrase of (60a): The rocks got smooth BY rolling.

But this is a significant addition to his theory. He now requires two rules to derive two separate variants of the Means CS for resultatives, one with an agent and one without. Stated in terms of our lexical approach, there would be two rules of RF, call them RF-A and RF-B.

(64) **The Means Analysis**

a. RF-A:

$$[\text{CAUSE}\ (\ w\ ,[\text{BECOME}\ \ (\ y\ ,[_{\text{PLACE}}\ \ ]\ )\ ]\ )\ ]\quad \text{BY}\quad \underbrace{\overset{\substack{[\ \ \dots\ \ ]\\ \downarrow}}{[\ \ \dots\ \ ]}}_{\text{inherited CS}}$$

b. RF-B:

$$[\text{BECOME}\ \ (\ y\ ,[_{\text{PLACE}}\ \ ]\ )\ ]\quad \text{BY}\quad \underbrace{\overset{\substack{[\ \ \dots\ \ ]\\ \downarrow}}{[\ \ \dots\ \ ]}}_{\text{inherited CS}}$$

Jackendoff, though, does not see the need for two rules for the resultative construction as a drawback of the Means Analysis, since there is a systematic relationship between the rules that is attested elsewhere in the grammar: the CS in (64b) is identical to (64a) except that it lacks the causative component. The relationship between these two resultative rules is identical to the relationship between causative–noncausative verb pairs such as *break* in (65). So, he claims, the rules can be related by the same lexical redundancy rule that relates those verbs, (66).

(65) a. Floyd broke the glass.
 b. The glass broke.

(66) Causative Formation

$$\begin{array}{c}[\ \dots\ ]\\ \downarrow\\ \text{CAUSE}\ (\ w\ ,\ [\ \dots\ ]\ )\end{array}$$

What this means, though, is that lexical redundancy rules are now being brought in to mediate not between lexical entries, as they traditionally do, but between rules. And for Jackendoff, these are not even **lexical** rules. Remember that he assumes that result XPs are adjuncts, added in the syntax. According to him, there are no lexical resultatives. So under this story, lexical redundancy rules would have to mediate between syntactic adjunct interpretation rules, completely outside the lexicon. This is a serious extension to the theory, one which is required only by his Means Analysis.

6.4.4 A Second Argument in Favor of the Agent Analysis: Weather Verbs

As mentioned above, the crucial difference between the Means and Agent analyses is what each one claims is the agent bringing about the resultant state, ie. the first argument of the highest CAUSE. For Jackendoff's Means Analysis it is the THING designated by the surface subject, like "the gardener". For our Agent Analysis it is the base verb's activity, an EVENT, e.g., "the gardener watering the tulips." However, even under the Agent Analysis, for causative verbs, the surface subject of the resultative will *appear* to be a THING. This is because in the causative CS that is inherited the subject is a THING, and this subject ends up in the subject position of the resultative. Since most resultatives are based on causative verbs, it is difficult to find examples to decide between the Means and Agent analyses.

However, consider the resultatives in (68), based on agentless weather verbs like those in (67).

(67) a. It snowed.
 b. It rained.
 c. It thundered.

(68) a. It snowed the roads impassable.
 b. It rained the seedlings flat.
 c. It thundered the children awake.
 d. It rained the golf course useless.

Under the Means Analysis, (68d) would be paraphrased as ‘it caused the golf course to become useless by raining’. But dummy *it* cannot cause anything. It cannot have the agent theta role (or any theta role, for that matter.) So, according to the Means Analysis, the resultatives in (68) should be ungrammatical.

The Agent Analysis, on the other hand, predicts these resultatives to be good. What causes the result is the entire CS inherited from the weather verb: “*its raining* caused the golf course to become useless”. *Its raining* is the agent, not dummy *it*.

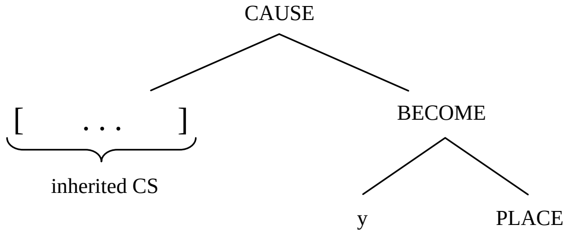
Though Jackendoff found no speakers who accept (68), many, in fact, do. And when asked what the sentences mean, they give them an Agent paraphrase.

And there is yet another, more intractable, problem for Jackendoff if weather-verb resultatives are deemed ungrammatical, as he suggests. The second resultative rule that he needed for unaccusative resultatives like *the rock rolled smooth*, (64), above, will actually handle these weather verbs, predicting them to be grammatical. Although Jackendoff paraphrases those unaccusatives as *the rocks got smooth BY rolling*, the CS inside the Means clause of an unaccusative contains an entire CS clause, and no coindexing is specified. So nothing will prevent weather verbs like *it rained the golf course useless* from being generated by his second resultative rule.

6.5 An Overview of Linking

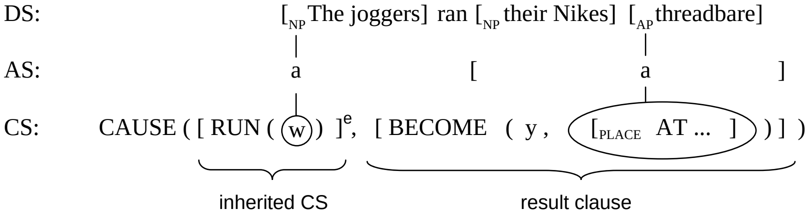
In this chapter and the previous one, we argued that Resultative Formation embeds the CS of a verb as the agent of a new causative change-of-state verb.

(69) CS of resultatives:

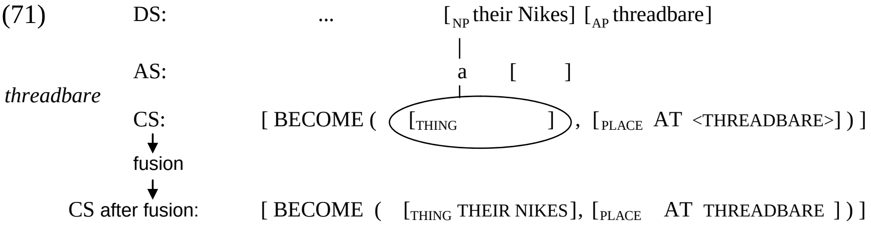


In accounting for how this resultative verb output CS links, we proposed that RF introduces a CS-AS mismatch: the result theme y does not link, as shown in (70) for the intransitive, *run*:

(70)

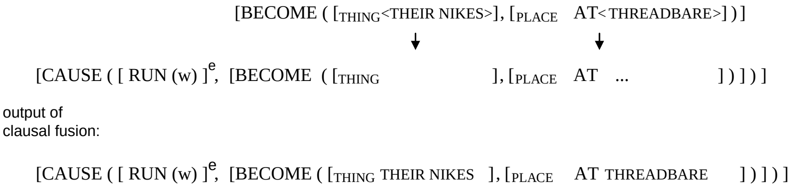

DS:
[NP The joggers] ran [NP their Nikes] [AP threadbare]
AS:
a [a]
CS:
CAUSE ([RUN (w)]e, [BECOME (y , [PLACE AT ...])])
inherited CS
result clause

(71)


DS:
...
[NP their Nikes] [AP threadbare]
AS:
a
[ ]
threadbare
CS:
[BECOME ([THING] , [PLACE AT <THREADBARE>])]
fusion
CS after fusion:
[BECOME ([THING THEIR NIKES], [PLACE AT THREADBARE])]

However, Clausal Fusion in the CS of the result XP argument guarantees that y is interpreted. The CS of *threadbare* is built up by the fusion of its external argument, *their Nikes*:
In the course of this CS fusing with the CS of the verb, the CS of the postverbal NP fuses with the verb's theme position:

(72) **Clausal Fusion** (intransitive resultatives)

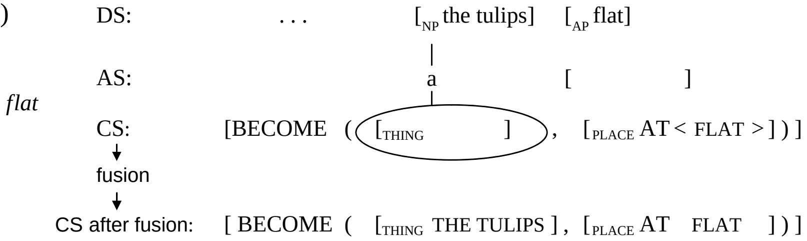

[BECOME ([THING<THEIR NIKES>], [PLACE AT<THREADBARE>])]
[CAUSE ([RUN (w)]e, [BECOME ([THING], [PLACE AT ...])])]
output of
clausal fusion:
[CAUSE ([RUN (w)]e, [BECOME ([THING THEIR NIKES], [PLACE AT THREADBARE])])]

The CS of *the joggers*, the external argument, fuses with w, giving the output for the sentence: Transitive resultatives work similarly. Fusion in the CS of *flat* involves

(73) [CAUSE ([RUN [$_{\text{THING}}$ THE JOGGERS]]^{e}, [BECOME ([$_{\text{THING}}$ THEIR NIKES], [$_{\text{PLACE}}$ AT THREADBARE])])]

one external argument, *the tulips*.

(74)


DS:
. . .
[NP the tulips] [AP flat]
AS:
a
[ ]
flat
CS:
[BECOME ([THING] , [PLACE AT < FLAT >])]
fusion
CS after fusion:
[BECOME ([THING THE TULIPS] , [PLACE AT FLAT])]

As shown in (75), when *flat*'s CS fuses with the verb's CS, the CS of the adjective's external argument, *the tulips*, maps into the y position in the verb's CS (we are abbreviating the inherited CS for now as [. . .]):

(75) CS from (74): BECOME ([$_{\text{THING}}$ THE TULIPS] , [$_{\text{PLACE}}$ AT FLAT])

↓ ↓ ↓ ↓

fusion with the verb's CS:

↓

CAUSE ($\underbrace{\text{[...]}}_{\text{inherited CS}}$^{e}, [BECOME ([$_{\text{THING}}$] , [$_{\text{PLACE}}$ AT])])

CS after fusion: CAUSE ($\underbrace{\text{[...]}}_{\text{inherited CS}}$^{e}, [BECOME ([$_{\text{THING}}$ THE TULIPS] , [$_{\text{PLACE}}$ AT FLAT])])

But inside the inherited portion of this transitive resultative are two arguments, w and x:

(76) CAUSE ([CAUSE (w , [BECOME ([$_{\text{THING}}$ <WATER>] , [$_{\text{PLACE}}$ AT x]])]^{e} ,

inherited CS (from *water*)

[BECOME ([$_{\text{THING}}$ THE TULIPS], [$_{\text{PLACE}}$ AT FLAT])])

result clause

When the CSs of *the gardener* and *the tulips* fuse with w and x, the output, now with 3 arguments (in bold), looks like (77):

(77) CAUSE

([CAUSE ([**THE GARDENER**] , [BECOME ([<WATER>] , [$_{\text{PLACE}}$ AT [**THE TULIPS**]])]^{e},

inherited CS (from *water*)

[BECOME ([$_{\text{THING}}$ **THE TULIPS**] , [$_{\text{PLACE}}$ AT FLAT])])

result clause

So for both intransitive and transitive resultatives, the result theme y cannot link. If it did, fusion would apply to it twice, violating the Prohibition Against Double Fusion, repeated in (78), a constraint that we showed, in Section 2 of this chapter, is independently motivated for other classes of verbs.

(78) **Prohibition Against Double Fusion**
Fusion cannot apply more than once to a CS constituent.

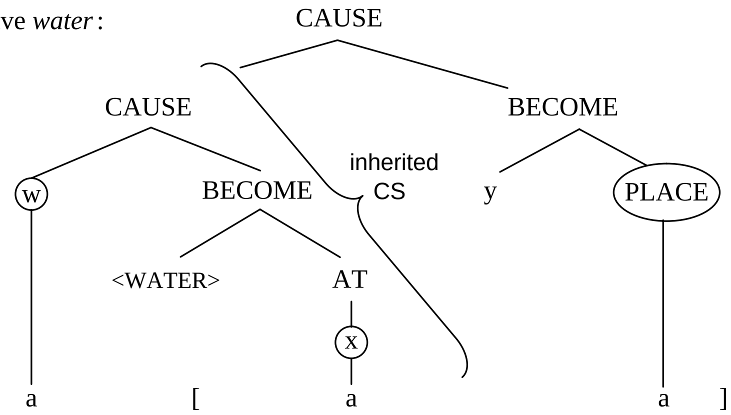
The non-linking of y correctly corresponds to the results of our argumenthood tests, on the postverbal NPs of resultative verbs. Intransitive resultatives fail the tests but transitive resultatives pass them. Their postverbal NP is not only an argument of the head of the result XP, it is also an argument of the verb because, for transitive verbs, x links.

It was the linking of resultatives that forced a change in our linking principle, the ILH.

(79) **Isomorphic Linking Hypothesis** (preliminary version)
The linking nodes at CS map isomorphically into the terminal nodes at AS.

In the tree corresponding to (77), shown in (80), the relative levels of w, x and PLACE could not all be reflected by their AS positions, if we took the entire tree geometry into account.

(80) resultative *water*:



However, we observed that the relative levels are correct **within** CS c-command domains, proposing the terms "CS c-command", in (81) and (82), because the nodes involved are CS function nodes, and defining "CS-domain", in (83):

(81) **CS c-command**
For two CS constituents, A and B,
A CS c-commands B iff the first branching CS function node dominating A also dominates B.

(82) **Asymmetric CS c-command**
For two CS constituents, A and B,
A asymmetricallly CS c-commands B iff the first branching CS function node dominating A also dominates B and not vice-versa.

(83) **CS Domain**
Two CS constituents, A and B, are in the same CS Domain iff
A CS c-commands B or B CS c-commands A.

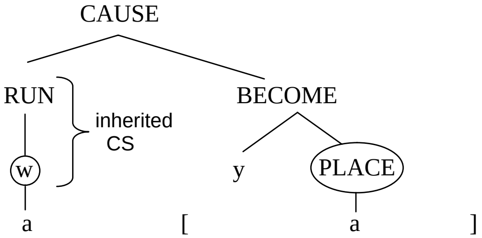
Based on these definitions, we proposed that isomorphism be determined within CS domains, revising the ILH as in (84).

(84) **Isomorphic Linking Hypothesis** (final version)
The linking nodes at CS map isomorphically into the terminal nodes at AS *within each CS Domain*.

Now the only constituents that must link relative to each other are those in a CS c-command relationship. In (80), x must link to a relatively lower position than w, because w c-commands x. So w links externally and x, internally. But w and PLACE are in different CS domains, neither c-commanding the other. In its own CS domain, PLACE has a (non-linking) terminal sister, y, so it links to the remaining internal AS position.

The revised ILH also correctly predicted the linking of intransitive resultatives, with trees like (85):

(85) resultative ***run***

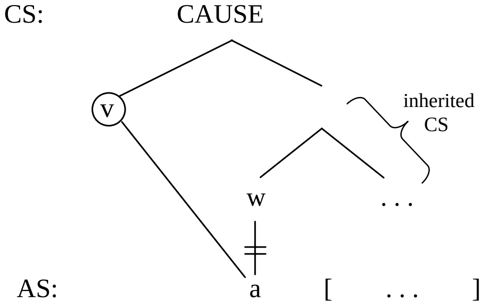


Here, w is the unique linking argument in its CS domain so it links to the unique AS position, which is external. PLACE has a (non-linking) sister, y, so it links internally, to a position in the AS template with a sister.

In both transitive and intransitive resultatives, the linking of w (and x, for transitives) is the same as in the input base verb. The agent of the base verb's CS, though not the agent of the resultative (the entire CS clause is the agent), ends up in the subject position of the resultative output verb.

We observed that resultatives contrast with the linking of morphological causatives in languages like Tagalog and Chichewa-B, in which the CS of the base input verb is inherited as the second argument of a higher CAUSE function, as shown in (86).

(86) Tagalog/Chichewa-B causatives:



Since the agent, v, of this new higher CAUSE c-commands all of the inherited CS arguments, it assumes the external argument position, displacing any old external argument in the process, which may or may not relink.

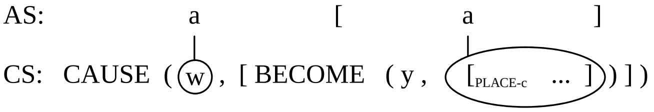
With the linking of resultative verbs hinging on the Prohibition Against Double Fusion in (78), it was necessary to show that this constraint was not subsumed by the Theta Criterion, (87). In fact, the PADF turned out to be motivated not only for resultatives but for many other verb classes.

(87) **Theta Criterion**
Within the argument structure of a predicate,
a. each argument must thematically license one and only one syntactic constituent and
b. a syntactic constituent may saturate one and only one argument.

Finally, Section 4 of this chapter compared our account of resultatives with Jackendoff's (1990) account. Though similar in spirit, both based in Conceptual Structure (his "Lexical" Conceptual Structure), his analysis fails to make a number of correct predictions that our account makes, with a more complex apparatus.

And now we have a new task. If our account of resultative linking is correct, then it makes a prediction. In simple change-of-location and change-of-state verbs, with a skeletal CS like (88), if the PLACE links then the theme cannot link, lest it violate the Prohibition Against Double Fusion.

(88)

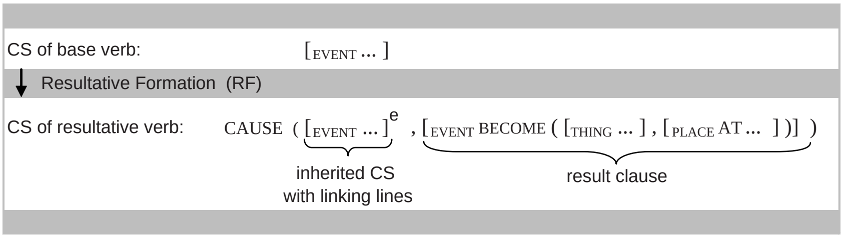


The next chapters will examine this prediction and the other predictions of the Isomorphic Linking Hypothesis, as we turn to the linking of many more classes of verbs across the lexicon.

Part II
More Linking Results Across the Lexicon

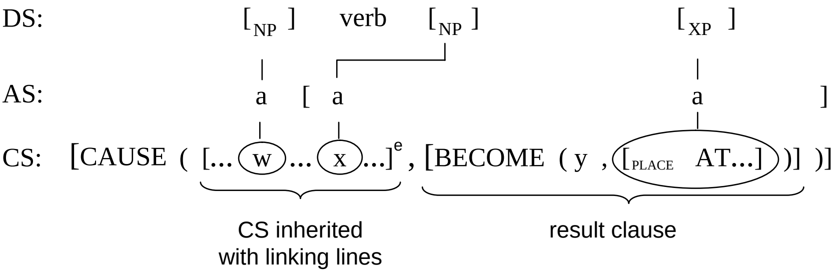
In Chapters 5 and 6 we proposed that the lexical rule of Resultative Formation (RF) embeds the CS of the base verb as the agent of a causative change-of-state CS:

(1)

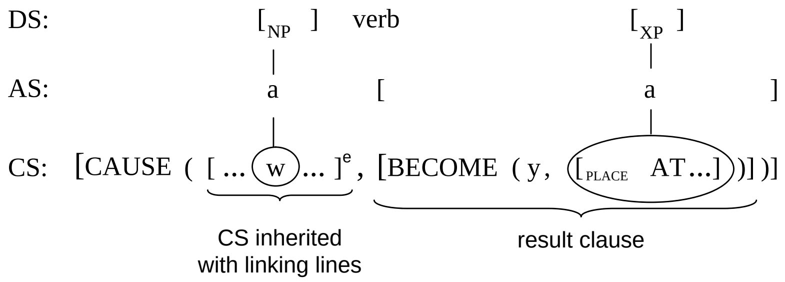

CS of base verb:
[EVENT ...]
Resultative Formation (RF)
CS of resultative verb:
CAUSE ([EVENT ...]e , [EVENT BECOME ([THING ...] , [PLACE AT ...])])
inherited CS with linking lines
result clause

In characterizing the AS–CS mapping for resultatives, we argued that the result theme, “[$_{\text{THING}\,...}$]” in (1), cannot link to a position in the AS of the verb. Given Clausal Fusion, if it were to link, intransitive resultatives – both unergative and unaccusative – would have two internal arguments and transitive resultatives would have three. But this is not the case. As shown in (2) for transitive resultatives and in (3) for the two types of intransitives, **with respect to the verb**, the [$_{\text{THING}\,...}$], abbreviated as y, is an implicit argument.

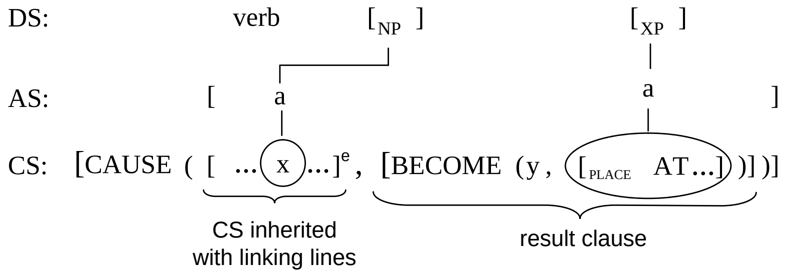
(2) Transitive resultatives


DS:
[NP]
verb
[NP]
[XP]
AS:
a [a a]
CS:
[CAUSE ([... w ... x ...]e , [BECOME (y , ([PLACE AT...]))])]
CS inherited with linking lines
result clause

(3) a. Intransitive unergative resultatives

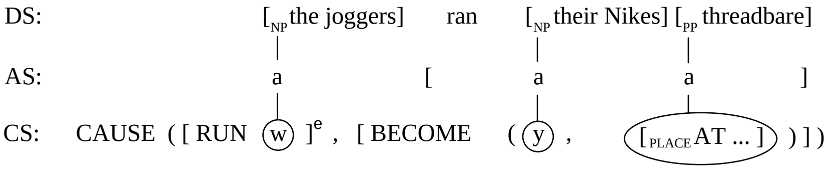

DS:
[NP]
verb
[XP]
AS:
a
[
a
]
CS:
[CAUSE ([... w ...]e , [BECOME (y , ([PLACE AT ...]))])]
CS inherited with linking lines
result clause

b. Intransitive unaccusative resultatives


DS:
verb
[NP]
[XP]
AS:
[
a
a
]
CS:
[CAUSE ([... x ...]e , [BECOME (y , ([PLACE AT ...]))])]
CS inherited with linking lines
result clause

We proposed that the non-linking of y in the verb's CS is a necessity, not an accidental property of RF. If y did link to an AS position, as in our hypothetical rule, "RF-2", the CS of an XP in the syntax would fuse with y. For the intransitive resultative *run* in *the joggers ran their Nikes threadbare* in (4), the output of fusion would contain the CSs of the three XPs, as shown in (5), with the CS of *their Nikes* fused with y.

(4)



(5) CS after fusion:

CAUSE ([RUN [$_{\text{THING}}$ THE JOGGERS]] , [BE(COME) ([$_{\text{THING}}$ THEIR NIKES] , [$_{\text{PLACE}}$ AT THREADBARE])])

But at the same time, when the CS of the PLACE fuses with this verb, as shown in (6) for *threadbare,* its external argument already contains the CS of *their Nikes*, which has fused with this CS as the external argument of this adjective.

(6) DS: ... [$_{\text{NP}}$ their Nikes] [$_{\text{AP}}$ threadbare]
AS: a [ ]
threadbare
CS: [BECOME ([$_{\text{THING}}$ THEIR NIKES] , [$_{\text{PLACE}}$ AT <THREADBARE>])]

There is no room in the CS of the verb for both CSs to fuse. This “double fusion” is prohibited by the Prohibition Against Double Fusion (PADF), repeated in (7), which we introduced for independent reasons in Chapter 4, Section 2, to prevent the double fusion of two adjuncts and of an adjunct and an argument.

(7) **Prohibition Against Double Fusion**
Fusion cannot apply more than once to a CS constituent.

The Isomorphic Linking Hypothesis (ILH), repeated in (8) (from Chapter 5 (84)), is still responsible for determining the possible CS – syntax linkings based on the geometry of CS, but the addition of the PADF constrains this correspondence and predicts that for **all** change-of-location and change-of-state verbs with a theme and a PLACE at the same level in the same CS clause, either the theme links or the PLACE links, but not both.

(8) **Isomorphic Linking Hypothesis** (final version)
The linking nodes at CS map isomorphically into the terminal nodes at AS *within each CS Domain.*

What this means is that the analyses that we gave to a number of verb classes in earlier chapters cannot be right. In the following chapters, we will reanalyze those classes in line with our new proposal and analyze several additional verb classes that we have not seen before. Along the way, we will show that the predictions of the Isomorphic Linking Hypothesis hold.

Chapter 7

Causative Verbs with PLACE Arguments

The first classes of verbs to require another look are causative verbs with PLACE arguments. These include two types: change-of-state verbs, with an abstract PLACE and change-of-location verbs, with a concrete PLACE. We begin with verbs that take an obligatory PLACE argument and then consider optional PLACE argument verbs.

7.1 Obligatory PLACE Arguments: *render, put,* and *get* are not Three-Argument Verbs

When we first encountered verbs that require two postverbal XPs in the syntax, like *render*, *put*, and one version of transitive *get* in (9), we claimed that their CSs are similar to resultatives, sharing the basic skeleton in (10).

(9) a. The computer rendered the typewriter useless.
b. She put the books into the box.
c. The spilled coffee got John's typewriter wet.

(10) $$[\ \text{CAUSE}\ (\ \underbrace{[\quad]}_{\text{agent}}\ ,\ \underbrace{[\ \text{BECOME}\ (\ y\ ,\ [_{\text{PLACE}}\ \text{AT}\ \ldots\ ]\ )\ ]}_{\text{change-of-state clause}}\ )\ ]$$

However, the CS of each of these classes requires a slight modification. First, whereas the agent for a resultative is an EVENT, the agent for *put* is a THING and the agent for *render* is unspecified: it can be either a THING or an EVENT consisting of an entire embedded clause (see Chapter 5, footnote 4). For this reason, we do not represent the agent with a variable like w, which stands for THING, but instead use brackets. Second, *render* is like a resultative in taking an abstract PLACE, since it is a change-of-state verb. However, the PLACE for *put*, a change-of-location verb, is concrete, a location. And as we might expect, there is a third type, whose PLACE is unspecified – it can be either a state or a location. This is the *get* and *keep* class.

We will see below that despite their differences, all three of these subclasses pattern with resultatives in their linking: the theme, y, does not link, in accordance with the Prohibition Against Double Fusion, in (7), above.

J. Randall, *Linking: The Geometry of Argument Structure*, 207–228

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7.1.1 Abstract PLACE Verbs: *render* and *make*

The CS for *render* and (under the relevant reading) *make*, is shown in (11).

(11)
$$[\text{CAUSE}\ (\underbrace{[\quad]}_{\text{agent}}\ ,\ \underbrace{[\text{BECOME}\ (\ y\ ,\ [_{\text{PLACE-a}}\ \text{AT}\ \ldots\ ]\ )\ ]}_{\text{change-of-state clause}}\ )\ ]$$

The PLACE is abstract (abbreviated as PLACE-a), and the agent is unspecified because, as we just noted, it can be an entire inherited CS clause (an EVENT), as in (12) or simply a THING, as in (13).

(12) a. Their buying a computer rendered their typewriters useless.
b. His continual banging on it made the typewriter useless.

(13) a. The computer rendered the typewriter useless.
b. The jammed keys made the typewriter useless.

Thus the internal structure of the agent for these verbs is supplied not by their lexical entries but by the choice of NP subject in the syntax.

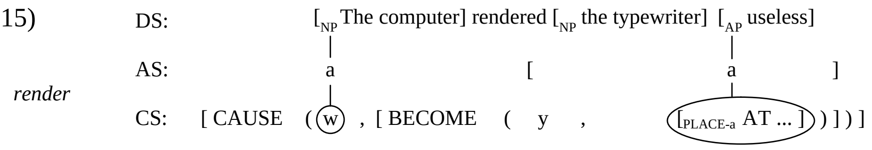
We have been operating on the assumption that the PLACE for these verbs links as an argument and our tests confirm this. The PLACE PPs fail the V-projection fronting and *do so* tests in (14a), while the PP adjuncts in (14b) pass them.

(14) a. *The surgeon said that he could render John's arm usable again and [render John's arm] he did [usable again].
*His boss makes John [unhappy] but his wife does so [happy].

b. The surgeon said that he could render John's arm usable again [with an operation] and render John's arm usable again he did [with laparoscopic surgery].
His boss makes John happy [on weekdays] and his wife does so [on weekends].

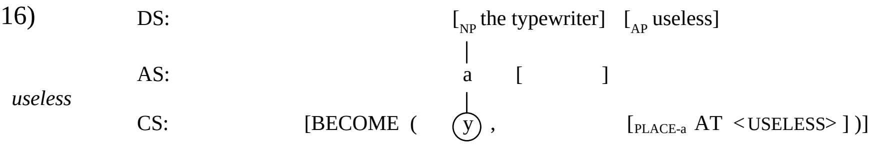
We propose, then, that for CSs based on (11), the agent and the PLACE link but the y theme in the change-of-state clause does not. The linking for *render* in (13a) is shown in (15).

(15)


DS: [NP The computer] rendered [NP the typewriter] [AP useless]
AS: a [a]
render
CS: [CAUSE (w , [BECOME (y , [PLACE-a AT ...])])]

So, *useless* is an argument of the verb *render* but *the typewriter* is not. The theme is implicit and with respect to the verb, the NP *the typewriter* is uninterpreted. Of course, *the typewriter* **is** interpreted as the theme of the entire event, but this is because it is at the same time the external argument (the subject) of *render*'s internal argument, the AP *useless*. As shown in (16), *the typewriter* satisfies the external argument position in *useless*'s AS, and therefore fuses with its theme position, producing (17).

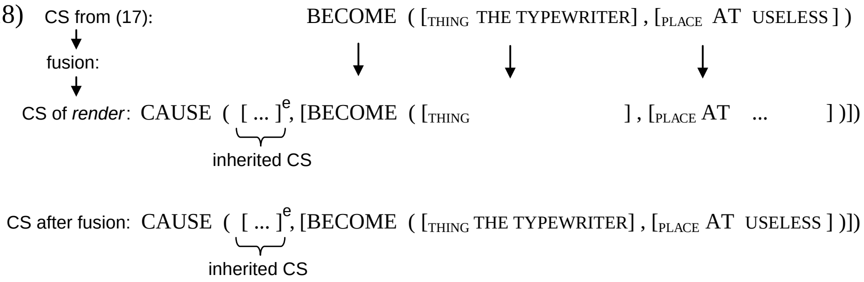
(16)


DS:
[NP the typewriter] [AP useless]
AS:
a [ ]
useless
CS:
[BECOME (y , [PLACE-a AT <USELESS>])]

(17) CS after fusion: [BECOME ([THE TYPEWRITER] , [$_{\text{PLACE-a}}$ AT USELESS])]

Since [$_{\text{AP}}$ useless] is the internal argument of *render*, (17) then fuses with the CS of *render* in (15), as shown in (18). As a side-effect, y in the CS of the verb is filled in with the theme in the CS of *useless*, THE TYPEWRITER.

(18)


CS from (17):
BECOME ([THING THE TYPEWRITER] , [PLACE AT USELESS])
fusion:
CS of render: CAUSE ([...]e, [BECOME ([THING] , [PLACE AT ...])])
inherited CS
CS after fusion: CAUSE ([...]e, [BECOME ([THING THE TYPEWRITER] , [PLACE AT USELESS])])
inherited CS

The CS of the sentence is complete when the CS of the external argument of *render*, *the computer*, fuses with the agent:

(19) [CAUSE ([THE COMPUTER] , [BECOME ([THE TYPEWRITER] , [$_{\text{PLACE-a}}$ AT USELESS])])]

So postulating that y does not link for verbs like *render* in (15) does not lead to any problems interpreting *the typewriter* as the verb's theme. In fact, if y in the verb's CS did link, the PADF would be violated. As an argument of the verb, the CS of *the typewriter* would fuse twice with y in the CS of *render*: once through its own direct fusion with the verb and once by being contained in the CS of another of the verb's arguments. So our new claim about verbs like *render* is that they are like intransitive resultatives in that their postverbal NP is not an argument. Let us see if this claim is correct.

Evidence comes from the diagnostics for internal argumenthood that we identified in Chapter 2, Nominal Formation, Adjectival Passive Formation, and Middle Formation.[1] Recall that we used these tests to show that only in transitive but not intransitive resultatives is the postverbal NP an argument of the verb. Applying the tests to the postverbal NP of the *render* class leads to ungrammatical results, showing that the prediction is correct:

---

[1] MF additionally requires this argument to correspond to the verb's theme.

(20) Nominal Formation

a. *The rendering of office equipment useless was anticipated.
b. *The dean encourages the making of tests difficult.

(21) Adjectival Passive Formation

a. *the rendered-useless equipment
b. *the made-difficult tests

(22) Middle Formation

a. *Office equipment renders useless easily in the computer age.
b. *Calculus tests make difficult easily.

Another test, from Chapter 5, Section 2.2, was the rule of Passive Compound Formation (PCF). In the compounds that PCF creates, (a) the left-hand member must be an adjunct of the input verb and (b) the externalized argument must be the internal argument of the verb. Both conditions are satisfied by the compounds in (23a), which are derived from the verbs in (23b); the bracketed PPs are adjuncts.

(23)	a.	home-schooled children	b.	school children [at home]
		machine-picked strawberries		pick strawberries [with a machine]
		machine-watered tulips		water tulips [with a machine]
		hand-rubbed stones		rub stones [by hand]

Transitive resultatives in (24a) failed the first condition; intransitive resultatives, in (24b), both.

(24) a. *flat-watered tulips
*dry-spun sheets
*open-smashed sheets
*smooth-rubbed stones

b. *threadbare-run Nikes
*hoarse-shouted throat
*awake-crowed children

As (25) illustrates, *render* and *make* fail PCF, too. Like intransitive resultatives, their AP is an argument of the verb, not an adjunct, and their postverbal NP is not an internal argument, once more confirming our prediction. So the theme – y in the CS in (15) – does not link.

(25) *useless-rendered equipment
*difficult-made tests

But though y does not link as an argument of the verb, it must appear in postverbal position. Just like intransitive resultatives, these verbs (e.g., *render*) require a state, (e.g., $[_{\text{AP}}$ useless]), whose head, in turn, requires an external argument (e.g., $[_{\text{NP}}$ the typewriter]. This NP, in order to receive case, must immediately follow the verb. Thus, we have the *illusion* that the verb requires two postverbal arguments when the arguments are actually required by different heads.

Moreover, our theory predicts that we should not find verbs that are just like *render* except that they have two internal arguments, a linking theme and a linking PLACE, and we know of none. Their absence suggests that the Prohibition Against Double Fusion is not an artifact of our analysis of resultatives, but rather a general constraint that limits the outputs of linking principles.

7.1.2 Concrete PLACE Verbs: *put* and *position, lean* and *stand*

The *put* class (and the related class of position verbs, which includes transitive *lean*, *set* and *stand*) is similar to the *render* class, in taking an obligatory PLACE, the only difference being that this PLACE designates a location; it is concrete, as in (26a), rather than abstract, (26b).

(26) a. She put the books *(into the box).
She positioned the phone jacks *(under the painting).
She set a starfish *(on the bottom of the tank).
She leaned the ladder *(against the tree).
She stood a chair *(near the door).

b. *She put the books inaccessible.
*She positioned the phone jacks handy.
*She set a starfish visible.
*She leaned the ladder precarious.
*She stood a chair ready.

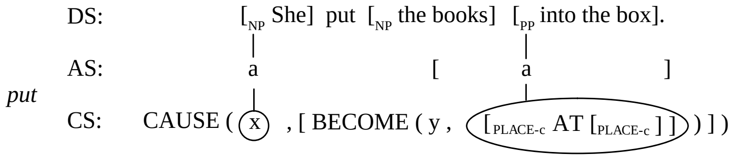
And just like the obligatory PLACE for *render*, this PLACE is an argument for *put*, as the tests in (27) confirm.

(27) a. *She puts money [in portfolio funds] and he does so [in the bank].
*She positions chairs [in circles] and he does so [in rows].
*She set a starfish [on the bottom of the tank] and he did so [on a rock].
*She leaned the ladders [against the tree] and he did so [against the building].
*She stood a chair [near the door] and he did so [under the window].

b. She puts money in portfolio funds [every week] and he does so [every month].
She positions chairs in circles [at meetings] and he does so [at parties].
She set a starfish on the bottom of the tank [at noon] and he did so [at 3 PM].
She leaned the ladders against the tree [yesterday] and he did so [today].
She stood some chairs near the door [for latecomers] and he did so [for the assistants].

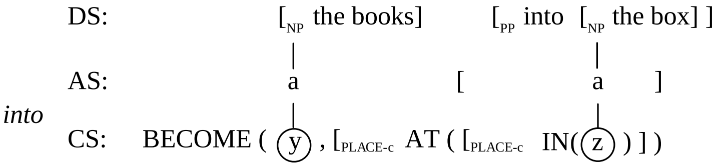
So the CS for *put* is just like the CS for *render*, except that the subscript on the linking PLACE is c, for “concrete”, as shown in (28).

(28)


DS:
[NP She] put [NP the books] [PP into the box].
AS:
a
[a]
put
CS:
CAUSE (x , [BECOME (y , [PLACE-c AT [PLACE-c]])])

And its linking follows the same pattern. As illustrated in (28), the agent and the PLACE link, but the theme does not. So in (26a), for example, *she* and *into the box* are arguments of the verb but *the books* is not. *The books* is the external argument of *into*, as shown in (29).

(29)

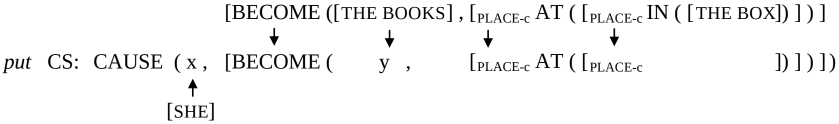

DS:
[NP the books] [PP into [NP the box]]
AS:
a
[a]
into
CS:
BECOME (y , [PLACE-c AT ([PLACE-c IN(z)])

Fusion applies to this CS, with the output in (30).

(30) CS: [BECOME ([THE BOOKS] , [$_{\text{PLACE-c}}$ AT ([$_{\text{PLACE-c}}$ IN ([THE BOX])])]

When fusion applies again to compose the verb *put's* CS, the CS of *she* fuses with the verb's linking subject argument, x, and (30) fuses with the BECOME clause. In the process, [THE BOOKS] fuses with the y position in the verb's CS.

(31)


[BECOME ([THE BOOKS] , [PLACE-c AT ([PLACE-c IN ([THE BOX])])]
put CS: CAUSE (x , [BECOME (y , [PLACE-c AT ([PLACE-c])])])
[SHE]

Again, as with *render*, y cannot link as an argument of the verb, because the CS of *the books* would also have to fuse independently with y, and this would cause a PADF violation.

Evidence that this analysis of the *put* class is correct comes from our three familiar diagnostics. Though the judgments are subtle, nominals, adjectival passives and middles are all ungrammatical with these verbs as shown in (32)–(34), but they are fine with similar verbs whose postverbal NP is an argument (and whose optional PP, if they have one, is an adjunct).[2]

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[2] To account for the ungrammaticality of examples such as (i)–(iii), Randall (1982b, 1985) (building on Carlson & Roeper, 1980) proposed that affixes such as *re-*, *-er* and *-able* cannot attach to verbs with (in our terms) two internal arguments.

(32) Nominal Formation

a. *The putting of fancy art books on coffee tables is considered pretentious.
cf. The displaying of fancy art books (on coffee tables) is considered pretentious.
b. *The positioning of outlets under paintings can be tricky.
cf. The installing of outlets (under paintings) can be tricky.
c. *The setting of starfish on the bottom of round fishtanks is impossible.
cf. The stacking of starfish (on the bottom of round fishtanks) is impossible
d. *The leaning of ladders against trees is prohibited by the authorities.
cf. The bracing of ladders (against trees) requires experience.
e. *The standing of chairs near doors can be hazardous.
cf. The assembling of chairs (near doors) can cause traffic jams.

(33) Adjectival Passive Formation

a. *The books remained put on the wrong shelves.
cf. The books remained shelved (on the wrong shelves).
b. *The outlets remained positioned under that painting for a long time.
cf. The outlets remained installed (under that painting) for a long time.
c. *The starfish remained set on the bottom of the tank.
cf. The starfish remained stacked (on the bottom of the tank).
d. *The ladder remained leaned against the tree.
cf. The ladder remained braced (against the tree).
e. *The chairs remained stood near the door.
cf. The chairs remained assembled (near the door).

(i) a. *The housecleaner reput the mat by the door.
b. *The nurse rehanded the scalpel to the doctor.
c. *The carpenters rerendered the ship seaworthy.
d. *He reconsidered the painting beautiful.
e. *the magic potion remade the princess young.

(ii) a. *putter of men on the moon
b. *hander of instruments to doctors
c. *renderer of ships seaworthy
d. *considerer of most art trash
e. *maker of old people young

(iii) a. *puttable, *handable, *renderable
b. considerable, makable (under the relevant interpretations)

However, according to our present approach, the verbs underlying these forms have only one internal argument, so their ungrammaticality needs another explanation. Perhaps these affixes, like the -*ing* of Nominal Formation, require the postverbal NP to be an argument of the verb. Alternatively, like Middle Formation, they could require that the base verb's internal argument be linked to the theme. And the sole internal argument for of all of these verbs is PLACE.

(34) Middle Formation

a. *Prewrapped cigars put into boxes easily.
cf. Pre-wrapped cigars box easily.
b. *Flat outlets position beautifully under paintings.
cf. Flat outlets install beautifully under paintings.
c. *Starfish set readily on the bottom of flat-bottomed tanks.
cf. Starfish stack readily (on the bottom of flat-bottomed tanks).
d. *Ladders lean easily against wide trees.
cf. This kind of ladder braces (against trees) easily.
e. *Chairs stand near doors readily.
cf. These chairs assemble (in rows) readily.

For cases that can take a single-word XP, Passive Compound Formation provides one more test. Like intransitive resultatives and *render*, these are predicted to fail on two grounds: the incorporated left-member is not an adjunct and the external argument does not correspond to an internal argument of the verb. And fail they do.

(35) *askew-put cigars
*sideways-positioned outlets
*upsidedown-set starfish
*nearby-stood chairs

The position that we are advocating here – that the problem with these cases is that they have no internal argument – is not the standard explanation for their ungrammaticality. Consider APF. Levin & Rappaport (1986) make the traditional assumption that a verb like *put* has two internal arguments, and observe that verbs with two **obligatory** complements seem never to undergo APF. To explain the ungrammaticality of adjectival passives like (36) (in contrast to the grammatical (37)), they adopt Williams' (1982) explanation, involving the Head-Final Filter. (The verb that they discuss is *read*, in (c), which takes an optional argument, but our examples in (a–b), with obligatory arguments, make the same point. The prefix *un-* insures that the form is adjectival not verbal, like *remain* in the examples in (33), which can take only an adjectival not a verbal complement.)

(36) a. *the unput on shelves books
b. *the unleaned against trees ladders
c. *the unread to children books

(37) a. the unshelved books
b. the unbraced ladders
c. the unread books

For them, the problem in (36) is that the obligatory PP cannot be incorporated into the adjective, which must be head (in this case, adjective)-final, as shown in (38a), and it also cannot intervene between the adjective modifier and the head noun, since there is no position for it:

(38) a. *[$_{A}$unput on shelves] books
b. *[$_{A}$unput] [$_{PP}$on shelves] books

Under this explanation, in prenominal (attributive) position, since the PP cannot appear, it would have to be omitted, as in (39).

(39) a. *the unput books
b. *the unleaned ladders
c. the unread books

But this triggers a Theta Criterion violation for adjectives with an obligatory location/goal argument. (Notice that (39c) is grammatical, because the argument is optional).

However, this account does not explain why these adjectives cannot be used predicatively, as in (40a). They violate neither the Theta Criterion nor the Head-Final Filter, as shown by adjectives like *fond*, whose obligatory complement does appear in that position.

(40) a. *The books remained unput on the shelves.
*The books remained unread to any children.

b. The teacher remained fond *(of her student).

Moreover, it does not account for the difference in grammaticality between adjectival passives from transitive and intransitive resultatives, which are identical in terms of category:

(41) a. the [$_{A}$ watered-flat] tulips
the [$_{A}$ spun-dry] sheets
the [$_{A}$ smashed-open] safe
the [$_{A}$ rubbed-smooth] stones

b. *the [$_{A}$ run-threadbare] Nikes
*the [$_{A}$ danced-thin] soles
*the [$_{A}$ crowed-awake] children
*the [$_{A}$ talked-unconscious] audience

Under our proposal for the *put* class, (36), (40a) and (41b) are all ruled out for the same reason: when APF looks at the verb for an internal argument to externalize, it fails to find one. The NP *books* in (36a), for example, is in the external argument position of the adjective illicitly, because it is not an argument of the underlying verb.

Two further facts support this analysis. First, the lack of an internal argument is the only difference between the ungrammatical (41b) and the grammatical (41a). Second, it explains why *consider*-class verbs also fail APF, as shown in (42).[3]

(42) *the considered-foolish officials
*the found-pleasant surroundings
*the deemed-worthy knight
*the judged-incompetent driver

Thus, our claim that the postverbal NP is not an argument of *put*-class verbs explains data that were previously unaccounted for.

There is one more loose end to tie up about APF. If APF simply externalizes a verb's internal argument, why does *put*'s location argument – under our analysis its sole internal argument – not externalize?

(43) *[On the wrong shelves] remained put.

It is because *on the wrong shelves* is also itself a predicate that needs an external argument (e.g., *the books*). In the structure in (43) there is no position where this argument could appear.[4]

7.1.3 Unspecified PLACE Verbs: *get* and *keep*

The *get* class in (44) is parallel to the *render* and *put* classes in that its agent can be either an inherited CS clause (an EVENT), as in (44a), or a THING, as in (44b).

---

[3] As we would expect (and as was originally pointed out by Carrier & Randall, 1992), these verbs also fail NF in (i) and MF in (ii), more evidence that these verbs' postverbal NPs are not their internal arguments.

(i) *[The considering of *John* a fool] is a mistake that many have made.
*[The finding of *one's surroundings* pleasant] is hard in desert conditions.
*[The deeming of *knights* worthy] was the job of the king.
*[The judging of *certain drivers* incompetent] is necessary to prevent accidents.

(ii) **Some people* consider fools easily.
**These surroundings* find pleasant easily.
**Those knights* will deem worthy readily.
**Certain drivers* judge incompetent quickly.

[4] As we noted in Chapter 2, example (23), PPs can be subjects:

(i) Under the bed remains my favorite hiding place.

But here no external argument is required, because *under the bed* is not a predicate. Also, recall that this PP also satisfies the "entity" condition discussed there, in that it refers to a space, much the way an NP like *the basement* or *the attic* does. This goes to show that notions like "subject" and "predicate" are not tied to syntactic category.

(44) a. [His spilling the coffee] got John's typewriter wet.
[John's running marathons] kept him extremely fit.

b. [The spilled coffee] got John's typewriter wet.
[John] kept himself extremely fit.

The *get/keep* class differs from the *put* and *render* classes only in that its PLACE is underspecified for abstract/concrete. Abstract locations (states) like *wet*, as in (44), or concrete locations like *into the repair shop*, as in (45), are both possible.

(45) John's continual banging on it got his computer into the repair shop.
John's running marathons kept him away from home.
John got his typewriter out of the basement.
John kept his pet iguana under his bed.

And our analysis for the *render* and *put* classes extends to this class readily. The postverbal NPs are not arguments of these verbs but are rather external arguments of the head of their XP. As such, these verbs should fail our internal argument tests. And they do: the outputs of Nominal Formation in (46), Adjectival Passive Formation in (47), and Middle Formation in (48) are all ungrammatical.

(46) a. *The tenants' organization warns against the getting of landlords angry.
b. *The keeping of money under beds is more common in rural areas.

(47) a. *the gotten-angry landlords
*the landlords remained gotten angry
cf. The landlords remained angered.

b. *the kept-hidden money
*The money remained kept under the bed.
cf. The money remained hidden (under the bed).

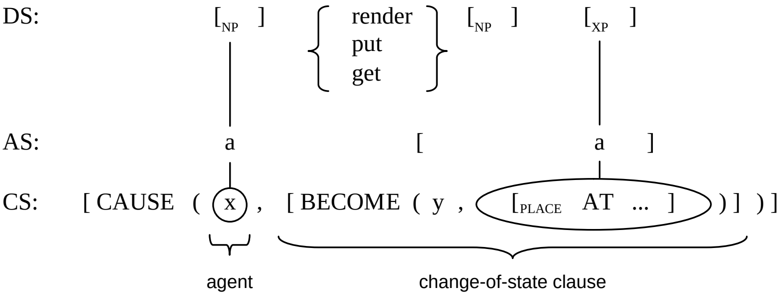
(48) a. *Pre-matted prints get straight easily. (on agentive reading)
cf. Pre-matted prints straighten easily.
b. *Money keeps under beds easily.
cf. Money stacks under beds easily.

They fail Passive Compound Formation as well, for the same reason and for the additional reason that the left-member of the compound is not an adjunct but is the verb's internal argument:

(49) a. *the angry-gotten landlords; *the messy-gotten clothes
b. *the hidden-kept money; *the dry-kept grain

In sum, four different argument-structure diagnostics support our claim that for the *render*, *put* and *get* classes, the postverbal NP is not an argument of the verb. In (50) is the skeletal CS for all these obligatory PLACE verbs.

(50)



Contrary to the general belief that these verbs are three-argument verbs, they actually take two obligatory arguments: one internal argument, the XP, and one external argument, the NP subject. The postverbal NP is an external argument of the head of the XP (preposition or adjective) but **not** an argument of the verb. With this argument structure, these verb classes link according to the Isomorphic Linking Hypothesis, (8), and are consistent with the Prohibition Against Double Fusion, (7).

7.2 Optional Implicit PLACEs

In this section, we revisit two classes of verbs that are similar to *put* and *render* except that the XP expressing their PLACE is optional: the *deliver* class, whose optional PLACE XP is a location, as in (51a), and the *convert* class, whose optional PLACE XP is a state, as in (51b).

(51) a. They deliver newspapers (to area residents).
b. She converted her basement (into a darkroom).

Though in Chapter 4 we initially analyzed both of these verb classes as having two arguments plus either a linking or non-linking PLACE, under our new claim, when a PLACE XP is present, the postverbal NP is not an argument of the verb; when it is absent, the postverbal NP is an argument of the verb. In this way, both subclasses of optional PLACE argument verbs are consistent with the Prohibition Against Double Fusion.

Following this, we reconsider a third set of optional state verbs, the transitive *break* class, which we have called “pseudoresultatives”. These verbs, as we will see, behave differently from the first two classes; the theme and the PLACE are **both** arguments of the verb. This suggests that their CSs are more complex, so that fusion can occur without violating the PADF.

7.2.1 Concrete PLACE Verbs: *deliver, transmit* and *convey*

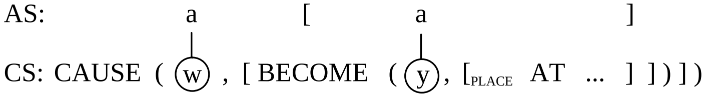
The verbs in (52) are just like *put* except that the PP linked to their PLACE is optional. As shown in (53), sentences without PPs are grammatical and do not sound elliptical.

(52) a. This company delivers newspapers to rural customers.
b. The machine transmitted the fax to everyone on the list.
c. The messenger conveyed the message to the distant villages.

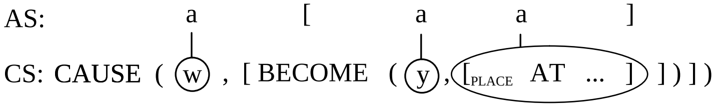
(53) a. This company delivers newspapers.
b. The machine transmitted the fax.
c. The messenger conveyed the message.

In Chapter 4, Section 1.3.1, we proposed that these change-of-location verbs have two internal arguments, one of which, the PP, is optional. Given that we are expressing optionality in separate entries, we assumed two entries for *deliver*, one with a PLACE that does not link, (54), and one with a PLACE that does, (55), giving this version of *deliver* three linking arguments, all appearing in the verb's AS.

(54) *deliver*



(55) *deliver*



The *do so* test, which only adjuncts pass, confirmed the argumenthood of the PP that expresses the PLACE in (55), as shown in (56) and (57).

(56) a. *This company delivers newspapers [to rural customers] while that company does so [to customers inside the beltway].
b. *This machine transmits faxes [to local fax machines] and that machine does so [to long-distance ones].
c. *The NGO conveys messages [to remote areas] but the government does so only [to local villages].

(57) a. This company delivers newspapers to rural customers [on weekends] while that company does so [during the week].
b. This machine transmits faxes to local fax machines [every day] and that machine does so [once a week].
c. The NGO conveys messages to remote areas [reliably] but the government does so [unreliably].

However, our new claim that the two CS arguments of BECOME cannot both link as arguments of the verb is incompatible with a 3-argument analysis. And in fact, our diagnostics show that (55) is not correct. True, the PP is an argument. But, as shown in (58), (59) and (60) Nominal Formation,[5] Adjectival Passive Formation and Middle Formation form grammatical outputs with these verbs **only** when this argument PP is absent. That is, only when the PP is absent does the postverbal NP link as an argument of the verb. When the argument PP is present, the postverbal NP is not an argument. This is exactly what is predicted given the PADF.[6]

(58) Nominal Formation
a. NP the delivering of newspapers
the transmitting of long faxes
the conveying of complicated messages

b. NP PP *the delivering of newspapers to rural customers
*the transmitting of long faxes to busy fax machines
*the conveying of complicated messages to remote areas

(59) Adjectival Passive Formation
a. NP the undelivered newspapers/the newspapers remained undelivered
the untransmitted fax/the fax remained untransmitted
the unconveyed message/the message remained unconveyed

b. NP PP *These newspapers remained undelivered to those customers.
*This fax remained untransmitted to this fax machine.
*The message seemed conveyed to those villages.

---

[5] The *-ing* nominals in (58a) may seem a little awkward because of the existence of the less productively derived nominals *delivery*, *transmission*, and *conveyance*. However, they are clearly better than the ungrammatical cases in (58b).

[6] Passive Compound Formation provides more evidence. Recall from Chapter 5, Section 2.1.3 that PCF incorporates adjuncts, not arguments. Thus in (i) the PLACE must link as an argument. Note that (ii) is not a valid test, since PCF can never incorporate multi-word elements (e.g., *remote areas*).

(i) *apartment-delivered furniture
(ii) *remote-area-conveyed messages

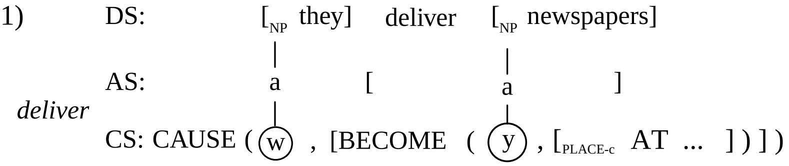
(60) Middle Formation

a. NP Neatly folded newspapers deliver easily.
Long faxes don't transmit easily.
Complicated messages don't convey easily.

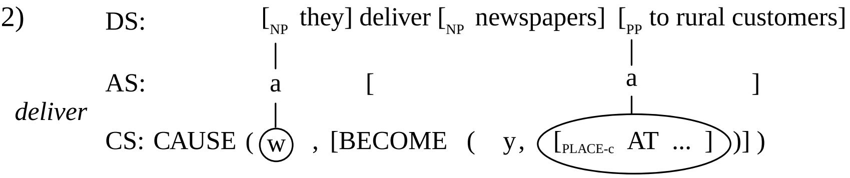
b. NP PP *Neatly folded newspapers deliver to fussy customers easily.
*Short faxes transmit to this fax machine more easily than long ones.
*Simple messages convey to remote areas more easily than complex ones.

As with the verbs we looked at earlier in this chapter, while the PP in (52a) (*to rural customers*) is an argument, its head is itself a predicate, taking the postverbal NP (*newspapers*) as its external argument. If this postverbal NP were *also* an argument of the verb, it would end up fusing with y in the verb's CS and violating the Prohibition Against Double Fusion. So these verbs, like *put*-class verbs, can have only one internal argument. Where they differ from *put* is that their one internal argument can be either the theme or the PLACE: when the PP is present it is an argument of the verb and the NP is not. When it is absent, the NP is the argument. So while the representation for *deliver* in (54), repeated in (61), is correct, (55) should be replaced by (62) in which the postverbal NP bears no direct relation to the verb at all. It serves only as the subject of this PP predicate.[7]

(61)


DS:
[NP they] deliver [NP newspapers]
AS:
a [a]
deliver
CS: CAUSE (w , [BECOME (y , [PLACE-c AT ...])])

(62)


DS:
[NP they] deliver [NP newspapers] [PP to rural customers]
AS:
a [a]
deliver
CS: CAUSE (w , [BECOME (y, [PLACE-c AT ...])])

---

[7] (61) and (62) represent two distinct lexical entries whose ASs and CSs are identical except for their linking. They could be collapsed into a single entry if we were to adopt a notation that makes it possible to express the idea that either the PLACE or the theme argument of BECOME links to the internal argument position (as in Jackendoff, 1990). We will continue to use a two-entry approach since the issue of whether there is one entry or two does not concern us here.

Notice that in (61), the presence in CS of the syntactically unrealized PLACE is what accounts for the fact that sentences containing these verbs without PPs, like (53), still have an understood, implicit, PLACE. And notice, too, that this change in representation remains consistent with the ILH. The external argument corresponds to the geometrically higher of the two linked CS arguments.

7.2.2 Abstract PLACE Verbs: *convert, change, alter* and *transform*

Verbs like *convert*, *change*, *alter* and *transform*, behave just like *deliver* except that their PLACE is abstract, a state.

(63) a. Amy converted her basement.
Amy converted her basement [into a darkroom].

b. The banker changed the Canadian dollars.
The banker changed the Canadian dollars [into pesos].

c. The tailor altered the pants.
The tailor altered the pants [into shorts].

d. Liz transformed the milk jug.
Liz transformed the milk jug [into a musical instrument].

In Chapter 4, Section 1.3.2 the *do so* test confirmed that the PLACE for *transform* and *change* is an argument, not an adjunct. The same is true for *convert* and *alter*. *Do so* replaces the verb and its arguments and can leave only adjuncts behind.

(64) a. *Amy converted her basement [into a darkroom] and Sue did so [into a theatre].
b. *One magician changes scarves [into bunnies] and the other does so [into doves].
c. *This tailor can alter pants [into shorts] and that one can do so [into capris].
d. *Liz transforms milk jugs [into musical instruments] and Bob does so [into boat bailers].

(65) a. Amy can convert a basement into a darkroom [by herself] and Sue can do so [only with help].
b. This magician changes scarves into bunnies [with a wand] and that one does so [without a wand].
c. This tailor alters pants into shorts [by hand] and that one does so [with a sewing machine].
d. Liz transforms milk jugs into musical instruments [frequently] and Bob does so [only sporadically].

When this PP PLACE argument is absent, the postverbal NP is an argument of the verb, but when the PLACE is present, the postverbal NP is not an argument. Confirmation comes from MF, APF and NF, which form good outputs only without the XP.

(66) Middle Formation
a. NP Some types of basements convert easily.
Canadian dollars change easily.[8]
Some types of pants alter easily.
Certain milk jugs transform easily.

b. NP PP *Some basements convert into darkrooms easily.
*Canadian dollars change into other currencies easily.
*Cotton pants alter into shorts easily.
*Certain milk jugs transform into musical instruments easily.

(67) Adjectival Passive Formation
a. NP the converted basement/the basement appears converted
the changed dollars/the dollars remained changed
the altered pants/the pants remained altered
the transformed milk jug/the milk jug remained transformed

b. NP PP *The basement appears converted into a darkroom.
*The dollars remained changed into pesos.
*The pants remained altered into shorts.
*The milk jug remained transformed into a musical instrument.

(68) Nominal Formation
a. NP the converting of basements
the changing of Canadian dollars
the altering of pants
the transforming of milk jugs

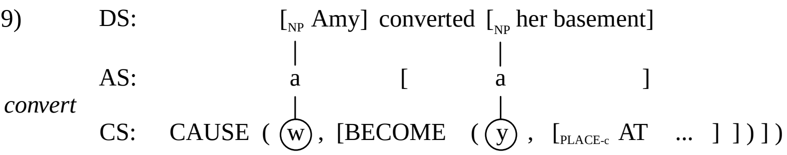
b. NP PP *the converting of basements into darkrooms
*the changing of Canadian dollars into other currencies
*the altering of pants into shorts
*the transforming of milk jugs into musical instruments

The representations for *convert* are exactly parallel to those for *deliver*:

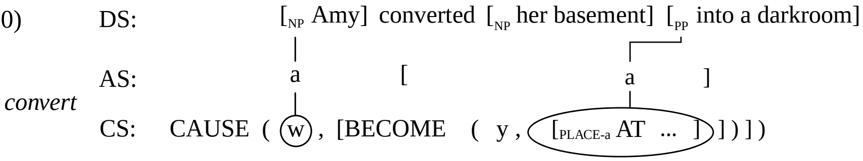
---

[8] It is difficult to apply the tests to *change* and come out with clear judgements, probably because of interference from the intransitive use of this verb.

(69)


DS: [NP Amy] converted [NP her basement]
AS: a [a]
convert
CS: CAUSE (w , [BECOME (y , [PLACE-c AT ...]])])

(70)


DS: [NP Amy] converted [NP her basement] [PP into a darkroom]
AS: a [a]
convert
CS: CAUSE (w , [BECOME (y , [PLACE-a AT ...]])])

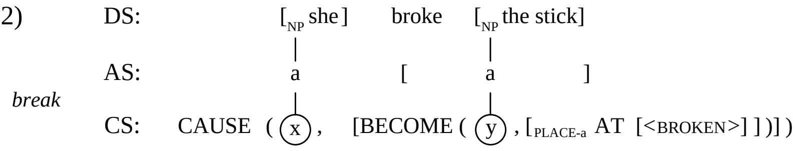
7.2.3 A Different Type of Abstract PLACE Verb, or “Pseudoresultatives”: transitive *break*

Like *convert*, *break*-class verbs are change-of-state verbs which optionally link their PLACE. The difference, as shown in Chapter 4, was that the *convert* class does not specify a particular PLACE – (63a) does not indicate the endstate of the basement – while the *break* class, in (71), does, with selectional restrictions, indicated in angled brackets.

(71)	She *broke* the stick.	<BROKEN>
	She *flattened* the tulips.	<FLAT>
	She *melted* the rubber.	<IN ALIQUID STATE>
	She *opened* the box.	<OPEN>
	She *froze* the quiche	<FROZEN>

In Chapter 4 our CS for transitive *break*, with its non-linking abstract PLACE was (72).

(72)


DS: [NP she] broke [NP the stick]
AS: a [a]
break
CS: CAUSE (x , [BECOME (y , [PLACE-a AT [<BROKEN>]])]])

When the PLACE is syntactically expressed, it must conform to the selectional restriction on this CS element, as shown by the contrasts in (73).

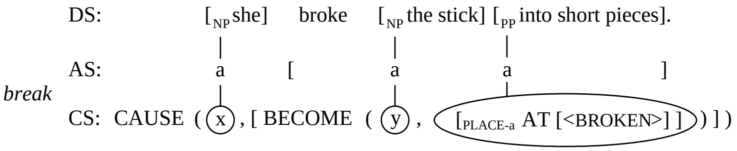
(73) a. She broke the stick *into six more or less equal pieces*/**into a whole*.
b. The gardener’s helper flattened the tulips *as flat as pancakes*/**into peaks*.
c. The chef melted the butter *to a fine liquid*/**into a solid*.
d. She opened the door *wide open*/**shut*.
e. She froze the quiche *rock solid*/**mushy*.

The *do so* test established in Chapter 4 that when the PLACE is present, it is an argument and not an adjunct.

(74) a. *John broke sticks [into short pieces] and Mary did so [into longer ones].
b. *The baker's helper flattened the dough [paper-thin] and the baker did so [a bit thicker].
c. *The chef melts butter [to a fine liquid] while the sous-chef does so [to a lumpy texture].
d. *Mary opens windows [wide open] but John does so [halfway open].
e. *This freezer freezes food [solid] but that one does so [rock-hard].

This led to the CS for the version in which the PLACE links, (75):

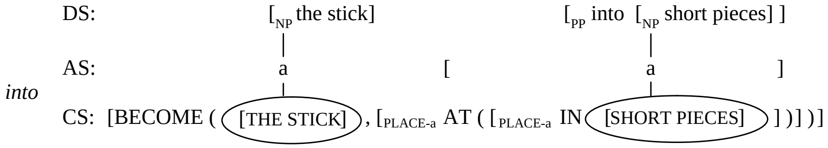
(75)


DS: [NP she] broke [NP the stick] [PP into short pieces].
AS: a [a a]
break
CS: CAUSE (x, [BECOME (y , [PLACE-a AT [<BROKEN>]])])

But as we will see, it turns out that this CS cannot be correct.

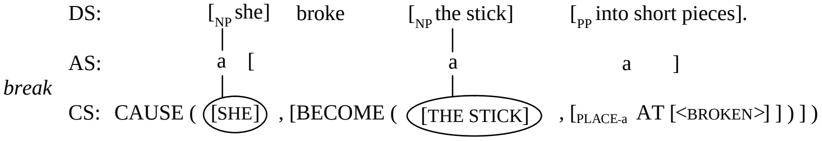
As with our verb classes above, if (75) were the CS for *break* with a PP argument, it would invoke a PADF violation. In building up the PP, fusion in the CS of *into*, as for the other verbs we have just analyzed, would yield (76).

(76)


DS: [NP the stick] [PP into [NP short pieces]]
AS: a [a]
into
CS: [BECOME ([THE STICK] , [PLACE-a AT ([PLACE-a IN [SHORT PIECES]])])]

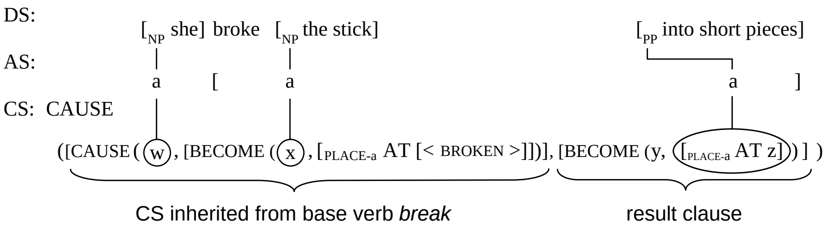
But if *the stick* were an argument of the verb, its CS would fuse with y in the CS of the verb in (75), and the CS of *she* would fuse with x, creating the partially completed CS in (77).

(77)


DS: [NP she] broke [NP the stick] [PP into short pieces].
AS: a [a a]
break
CS: CAUSE ([SHE] , [BECOME ([THE STICK] , [PLACE-a AT [<BROKEN>]])])

When the CS of the PP attempted to fuse with this CS, it could not, because the CS of the verb in (77) already contains the fused CS of [THE STICK] and a double fusion violation would result. So (75) cannot be the CS for *break* with a PP argument since, as for *convert*, when the PP is an argument of the verb, the postverbal NP cannot be.

While (72) is the CS for the version without the PP, we propose that the CS of the version of *break* with a PP is similar to the CS of resultatives. Many investigators have included the *break* class among the verbs that they call “resultatives”. Although we showed earlier that they are not true resultatives because they lack the necessary “extent” interpretation, we propose that their CSs are like resultatives in that the agent argument is a clause. This means that in *She broke the stick into short pieces*, *break* has the same three arguments as a transitive resultative, as shown in (78). Both the postverbal NP and the PP are arguments of *break*.

(78)

DS:
[NP she] broke [NP the stick]
[PP into short pieces]
AS:
a [a a]
CS: CAUSE
([CAUSE (w), [BECOME (x), [PLACE-a AT [< BROKEN >]])], [BECOME (y, ([PLACE-a AT z]))])
CS inherited from base verb *break*
result clause

With this CS, *she broke the stick into short pieces* means something like [her breaking the stick] caused the stick to be in short pieces.

Support for this analysis comes from our argument tests below, which these verbs pass, showing that the postverbal NPs for the *break* class are arguments of the verb, unlike the postverbal NPs for *convert* (and *put*). When their PLACE links, their theme links, too.[9]

(79) Nominal Formation
a. The breaking of cookies into bite-sized pieces is advisable if you don’t want to get crumbs on your lap.
b. The flattening of hubcaps into paper-thin forms is impossible.
c. This recipe calls for the melting of butter into a lumpy liquid.
d. The opening of the theater doors wide must wait until intermission.
e. The freezing of quiches rock-solid makes defrosting time-consuming.

(80) Middle Formation
a. Cookies break into bite-sized pieces easily.
b. Hubcaps do not flatten paper-thin easily.
c. Butter melts into a lumpy liquid easily.
d. These heavy doors open wide only with difficulty.
e. Some quiches freeze rock-solid easily.

---

[9] The relevant readings are derived from the transitive use of these verbs with an understood agent, not the intransitive unaccusative readings, with no understood agent.

(81) Adjectival Passive Formation
- a. The cookies remained broken into bite-sized pieces.
- b. The hubcaps remained flattened paper-thin.
- c. The butter remained melted into a lumpy liquid.
- d. The doors remained opened wide.
- e. The quiches remained frozen rock-solid.

Further support comes from Passive Compound Formation, in (82), which, if we are correct, these verbs should fail. For PCF to succeed, in (82c), for example, *quiches* would have to be an externalized internal argument, and *solid* would have to be an adjunct, since only adjuncts can be the left-member of a passive compound.

(82)
- a. *the thin-flattened hubcaps
- b. *the wide-opened doors (cf. the wide-open doors)
- c. *the solid-frozen quiches

But in fact, *solid* is an argument, so it cannot occupy that position. These compounds fail. Recall that we saw the same behavior from transitive resultatives, we claim, for the same reasons.

(83) *flat-watered tulips
*dry-spun sheets
*open-smashed sheets
*smooth-rubbed stones

Notice that our analysis of these verbs avoids violating the PADF. Returning to the representation in (78), the three arguments of the verb will fuse with their positions in the verb's CS, w, x and PLACE. After fusion of the CS of the subject and object with w and x in the verb's CS, the output looks like (84):

(84) [CAUSE

$$(\ \underbrace{[\text{CAUSE}\ \ (\ [_{\text{THING}}\ \text{SHE}\ ]\ ,\ [\text{BECOME}\ (\ [_{\text{THING}}\ \text{THE STICK}\ ]\ ,\ [_{\text{PLACE-a}}\ \ \text{AT}\ [\ \langle\text{BROKEN}\rangle]\ ]\ )\ ]\ )\ ]}_{\text{CS inherited from transitive } \textit{break}}$$

$$\underbrace{[\ \text{BECOME}\ (\ \ y\ ,\ [\ _{\text{PLACE-a}}\ \text{AT}\ z]\ \ )}_{\text{result clause}}\ ]\ )\ ]$$

As in resultatives, the CS of the PP *into short pieces* is a clause, as represented in (76). When this CS fuses with the CS of the verb, the entire clause fuses with the third line of (84). The CS of SHORT PIECES replaces z and the CS of the external argument of *into*, namely THE STICK, fuses with y, so no double fusion violation arises.

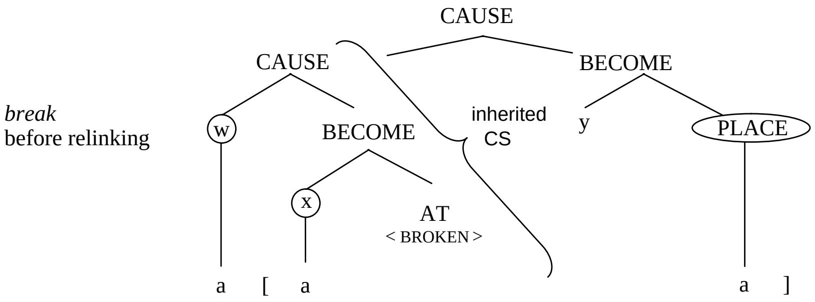
(85) [CAUSE

$$(\ [\ \underbrace{\text{CAUSE}\ (\ [_{\text{THING}}\ \text{SHE}],\ [\text{BECOME}\ ([_{\text{THING}}\ \text{THE STICK}],\ [_{\text{PLACE-a}}\ \text{AT}\ [\text{BROKEN}\ ]\ ]}_{\text{CS inherited from transitive } \textit{break}}$$

$$\underbrace{[\text{BECOME}\ ([_{\text{THING}}\ \text{THE STICK}],\ [_{\text{PLACE-a}}\ \text{AT}\ ([_{\text{PLACE-a}}\ \text{IN}\ (\text{SHORT PIECES})]\ )]\ ]}_{\text{result clause}}$$

So although *into short pieces* corresponds to a PLACE argument in the CS for *break*, it is possible for the theme, x, and this PLACE both to link according to the ILH and for fusion to occur without incurring a PADF violation. As with resultatives, y remains unlinked in the CS of the verb. w and x link in one CS Domain and the PLACE in the BECOME clause links in the other CS Domain. y will get its interpretation in the by-now usual way, through the fusion of the external argument of *into*, before the PLACE fuses with the CS of the verb. For clarity, the CS in (85) is shown with linking lines to AS in (86):

(86)



This analysis of the transitive *break* class, both with a PP argument (our “pseudoresultatives”) and without one, translates easily into a parallel analysis for the intransitive versions of these verbs, which we propose in the next chapter.

Chapter 8

Unaccusatives: A Cluster of Verb Classes

The focus of this chapter is unaccusative verbs (both change-of-location and change-of-state) and how they should be reanalyzed given our conclusions about Clausal Fusion. Section 1 reconsiders obligatory PLACE argument verbs (*go, turn*), Section 2, optional PLACE argument verbs (*fall, change*). Section 3, reconsiders unaccusative “pseudoresultatives” (*break*), which contrast with true unaccusative resultatives (*roll, burn*), discussed in Section 4. “Alternating” unaccusatives are the topic of Section 5. Taken together, these reanalyses raise an important question: how do we define “unaccusative verb”? After offering an answer, we look at some alternating unaccusative classes that we have not seen before.

8.1 Unaccusative Verbs with Obligatory PLACE Arguments: *go*, *turn*, *get*, and *be*

Chapters 1 and 2 examined unaccusative verbs with obligatory PLACE arguments like *go*, whose PLACE is a location. As with causative verbs, the PLACE can also be a state or it can be unspecified, either location or state. The CS function can also range, over BECOME or BE.[1] We begin with BECOME change-of-location verbs, the *go* (*come, emerge, arrive, appear, disappear*)-class, in (1).

(1) Liza went to the store.
Sometimes, uninvited guests come to parties.
Butterflies emerge from cocoons.

In our first pass at these verbs, we followed the standard assumption that *go* is an unaccusative verb with two internal arguments, a theme and a PLACE-c (location), as in (2).[2]

---

[1] Also, as discussed in Chapter 1, (77), the PLACE can be either complex (containing another PLACE) or simple (containing only a THING). However, this difference is not relevant here.

[2] The CS of *go* technically contains [BECOME ([$_{\text{THING}}$], [$_{\text{PLACE-c}}$ AT . . .])] However, to streamline our diagrams, we will sometimes omit the predictable function AT inside the PLACE.

J. Randall, *Linking: The Geometry of Argument Structure*, 229–257

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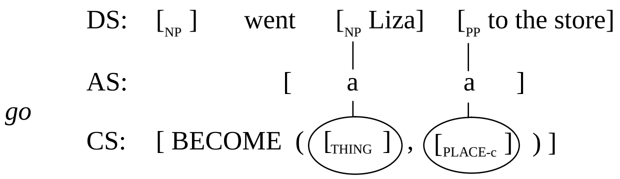
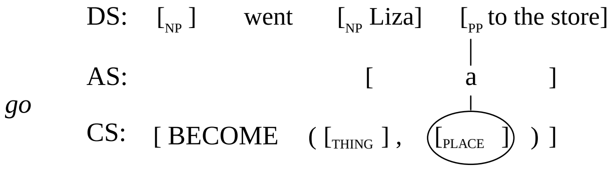
(2)


DS: [NP] went [NP Liza] [PP to the store]
AS: [a a]
go
CS: [BECOME ([THING] , [PLACE-c])]

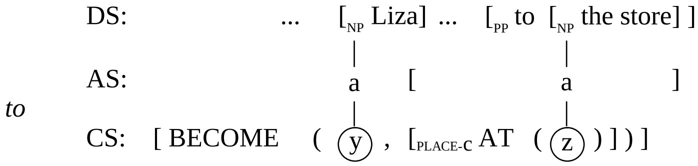
However, we now see that linking **both** the theme and the PLACE would violate the PADF. Instead, *go* in (3), like *put*, must have only one internal argument, [$_{\text{PP}}$ to the store].

(3)


DS: [NP] went [NP Liza] [PP to the store]
AS: [a]
go
CS: [BECOME ([THING] , [PLACE])]

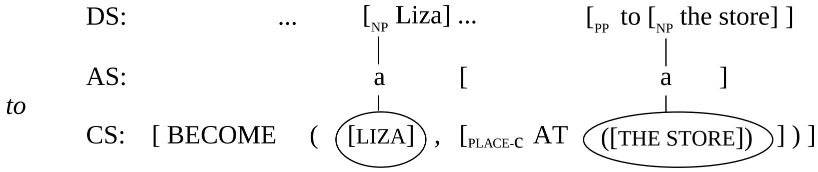
As we argued for *put* in Chapter 7, Section 1.2 what looks like the theme argument of the verb, here, [$_{\text{NP}}$ Liza], is in fact **not** an argument of the verb at all. It is an argument of the preposition *to*, which has two arguments, an internal argument, *the store*, and an external argument, *Liza*, as shown in (4).

(4)


DS: ... [NP Liza] ... [PP to [NP the store]]
AS: a [a]
to
CS: [BECOME (y , [PLACE-C AT (z)])]

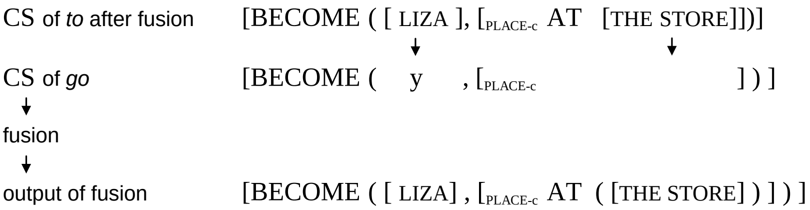
When the CS of the sentence is built up compositionally, fusion first applies to the arguments in the CS of the preposition *to*, as in (5).

(5)


DS: ... [NP Liza] ... [PP to [NP the store]]
AS: a [a]
to
CS: [BECOME ([LIZA] , [PLACE-C AT ([THE STORE])])]

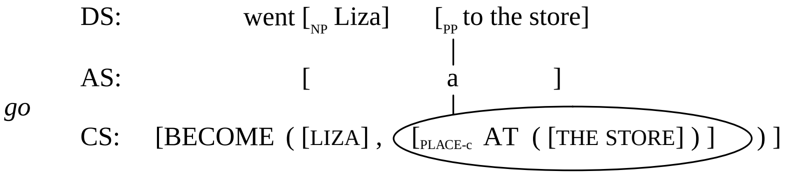
The output of this fusion is the input to fusion of the verb's arguments. As such, the CS of *the store* and *Liza* get fused with the theme in the CS of *go*, (here y), indirectly.

(6)


CS of *to* after fusion
[BECOME ([LIZA], [PLACE-c AT [THE STORE]])]
CS of *go*
[BECOME (y , [PLACE-c])]
fusion
output of fusion
[BECOME ([LIZA] , [PLACE-c AT ([THE STORE])])]

Unlike *put*, which has another external argument that must fuse for the CS of the sentence to be complete, here once the CS of the preposition fuses with the CS of the verb, all of the verb's arguments are accounted for.

(7)

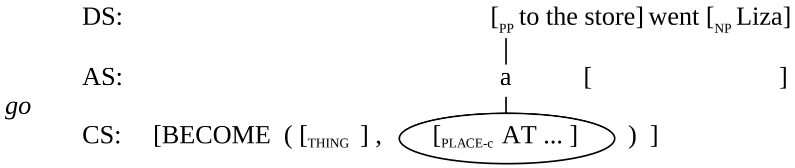

DS:
went [NP Liza] [PP to the store]
AS:
[a]
go
CS:
[BECOME ([LIZA] , [PLACE-c AT ([THE STORE])])]

In the syntax, movement applies to derive (8):

(8) $[\text{Liza}]_i$ went $[t]_i$ to the store.

Notice that for *go*, the position that the PLACE links to **must** be an internal argument position. Suppose that it linked externally. Then *go*'s AS would link to DS as in (9), with the PP external argument realized as the subject.[3]

(9)


DS:
[PP to the store] went [NP Liza]
AS:
a [ ]
go
CS:
[BECOME ([THING] , [PLACE-c AT ...])]

Now, [*To the store went Liza*] is grammatical, so we might wonder if there are two possible linkings for *go*, both compatible with the ILH: (3), with PLACE linking to an internal AS position and (9), with PLACE linking externally. But the linking in (9) is problematic: as a predicate, *to the store* requires a local subject at DS.[4] And (7) satisfies this requirement but (9) does not. We could try to solve this problem by saying that *Liza* is not the subject of *to the store* in (9). But then *Liza* would have no way of getting a theta-role, and this would violate the Theta Criterion. Predication theory, then, requires that the only possible analysis for *go* is (3), with the PLACE internally linked. And the linking in (3), as we expect, obeys the ILH. Although the theme does not itself link, it is a sister of the PLACE in CS, forcing the PLACE to link internally.[5]

---

[3] We assume that a PP in subject position does not violate Case theory, since PPs can occupy the subject position:

(i) Under the bed is where I like to be.
(ii) Under the bed is a good place to hide.

[4] This requirement goes back to McNulty's (1988) mutual m-command condition on predication.

The linking in (3) predicts that the NP subject for *go*-class verbs should fail the tests for internal argumenthood. We saw initial evidence for this in Chapter 3, Section 3; these verbs do not undergo Nominal Formation:

(10) Nominal Formation

a. *The going of children to school is mandated by state law.
b. *The coming of uninvited guests to parties can be a nuisance.
c. *The emerging of butterflies from cocoons takes a surprisingly short time.

And they also fail Adjectival Passive Formation, (11), in both predicative position, (a) and (b), and prenominally, (c), which can be tested only with single-word complements.

(11) Adjectival Passive Formation

a. *The children seemed gone to school.
*Some uninvited guests appeared come to the party.
*These butterflies appeared emerged from those cocoons.

b. *The dinosaurs remained gone away
*The children appeared come back
*The ship seemed arrived home

c. *the gone-away dinosaurs
*the come-back children
*the arrived-home ship

Middle Formation is difficult to use as a test for unaccusatives, since middle readings for these verbs are hard to distinguish from ordinary unaccusative readings, especially with animate subjects. Nevertheless, we find the cases in (12) ungrammatical. Note that they contrast with sentences with the parenthetical adverbs included, which bring out the non-middle, simple unaccusative readings. (Because of the subtlety of judgments, we will not use MF as a test in what follows.)

---

[5] Derived structures like [*To the store went Liza*] have been shown to be purely root clause phenomena by Emonds (1976, Chapter 2; 1985, Chapter 3) and others.

(12) Middle Formation

a. *These children go to school easily (cf. willingly).
b. *Some uninvited guests come to parties readily. (cf. unabashedly)
c. *Monarch butterflies emerge from wet cocoons easily. (cf. slowly)

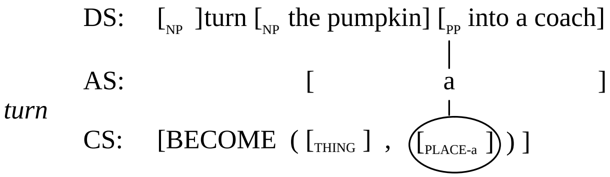
Thus, the NP for the *go* class is not an argument of the verb; it is an argument of the head of the XP, which is.

This analysis extends completely to obligatory abstract PLACE-a (change-of-state) verbs like intransitive *turn* and *become*, in (13a), and to unspecified PLACE verbs which can take either a location or state like *get* in (13b). *Turn* is represented as in (14). *Get* differs only in having no subscript on the PLACE.[6,7]

(13) a. The pumpkin turned into a coach.
The milk turned sour.
Earhart became famous.

b. The clothes got messy.
The raccoons got into the garbage cans.

(14)


DS: [NP]turn [NP the pumpkin] [PP into a coach]
AS: [a]
turn
CS: [BECOME ([THING] , ([PLACE-a]))]

Like *go*, these verbs can have only one internal argument or they will violate the PADF. For *turn*, the PP *into a coach* is a predicate whose subject is the NP, *the pumpkin*. When the PP's CS fuses with the verb's CS, the CS of *the pumpkin* fuses indirectly with the theme in the verb's CS.

As expected, the argument tests for this class yield the same results as for *go*.

(15) Nominal Formation (non-agentive readings)

*The turning of pumpkins into coaches is something you only hear about in fairy tales.
*The turning of milk sour can happen overnight.

---

[6] Although we usually think of *go* as a change-of-location verb, it can also take a limited range of abstract PLACEs: *The milk went sour*; *She went nuts*.

[7] *Turn* also has a directional sense, but unlike change-of-state *turn*, its PP is optional:

(i) The coach turned (into the driveway).
(ii) The coach turned *(into a pumpkin).

The PP-less use of *turn* will be discussed later in this chapter. There is also an intransitive change-of-state verb *turn* that has a more specialized meaning, which we will not be discussing:

(iii) This cider has turned.

*The becoming of Amelia Earhart famous was unexpected since women pilots were rare.
*The getting of clothes messy is a specialty of many children.
*The getting of raccoons into garbage cans is a nuisance.

(16) Adjectival Passive Formation

a. *Even though it was after midnight, the pumpkin remained turned into a coach.
*The milk seemed turned sour.
*Amelia Earhart appeared become famous.
*The clothes appeared gotten messy.
*Those raccoons appeared gotten into the garbage cans.

b. *the turned-sour milk
*the become-famous pilot
*the gotten-messy clothes

The same analysis extends naturally to unaccusatives like *live* and *be*. There are two differences between these verbs and the *go* and *turn* classes. First, their CSs contain BE instead of BECOME, since they are stative not change-of-location or change-of-state verbs. Second, *live*, like *go*, requires a concrete PLACE, but *be*'s PLACE is unspecified, either concrete, $[_{\text{PP}}$ on the new track], or abstract, $[_{\text{AP}}$ late], as shown in (17).

(17)

$$\begin{array}{lll} & \text{DS:} & [_{\text{NP}}\ ]\ \text{is}\ [_{\text{NP}}\ \text{the train}] \left\{\begin{array}{l}[_{\text{PP}}\ \text{on the new track}]\\ [_{\text{AP}}\ \text{late}]\end{array}\right\} \\ & \text{AS:} & [\qquad\qquad \text{a} \qquad\qquad] \\ \textit{be} & & \\ & \text{CS:} & [\ \text{BE}\ (\ [_{\text{THING}}\ ],\ \boxed{[_{\text{PLACE}}\ ]}\ )\ ] \end{array}$$

As (18) and (19) show, these verbs, too, fail the argumenthood tests, exactly as predicted.

(18) Nominal Formation

*The living of seniors in subsidized housing is common nowadays.
*The being of trains off the tracks means we have to walk a long way.
*The being of trains late makes commuting difficult.

(19) Adjectival Passive Formation

a. *Those seniors remained lived in subsidized housing.
*The trains remained been off the tracks.
*The trains remained been late.

b. *the been-late trains

But there is one argumenthood test that these verbs, and the ones in the previous sections, pass. Recall that in Chapter 2, (35), we showed that Nominal Formation, though limited to internal arguments, is not limited to NPs:

(20) a. The proving [that the earth is not flat] took many years.
This noting [that the plaintiff contradicted himself] pleased the judge.

b. This reading [to children] has become a nightly ritual in many families.
This leaning [against walls] that teenagers do annoys their parents.
The gazing [into each other's eyes], so common with new lovers, bothers onlookers.
This looking [for loopholes] is time-consuming.
This hiding [in closets] has got to stop.

When we apply NF to these verbs without their NP, but only with their PP or AP argument, they pass, reconfirming that this PP is an argument of the verb in the absence of the theme argument.

(21) Nominal Formation

a. this living [in subsidized housing] . . .
b. this being [late] . . .
c. this coming [to parties] uninvited . . .
d. this going [to school] by taxi . . .
e. this becoming [famous]

In sum, we have rejected the traditional assumption that in unaccusatives like *Liza went to the store*, *go* has two arguments. We claim that it has only one argument, internally linked, *to the store*. This argument, which is a predicate, takes *Liza* as its own, external, argument. The appearance that *Liza* is an argument of *go* arises because its CS fuses with the theme in the CS of *go* via the fusion of *to the store* with the CS of the verb.

8.2 Unaccusative Verbs with Optional PLACE Arguments: *fall* and *change*

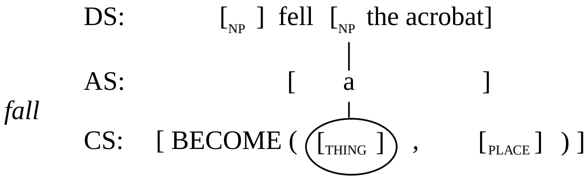
Alongside obligatory PLACE unaccusatives are those whose PLACE is optional. It can be either concrete, as in (22a), or abstract, (22b).

(22) a. That acrobat fell (into the net).
This treasure sank (to the bottom of the sea).

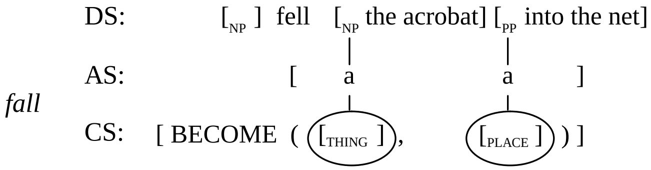
b. The tadpole changed (into a frog).

Just like their causative optional PLACE counterparts, *deliver* and *convert*, discussed in Chapter 7, Sections 2.1 and 2.2, when these non-causative optional PLACE verbs appear without a PP, the PLACE is implicit, as shown in (23). But the ILH and the PADF force us to challenge the standard assumption that when a PP is present, the postverbal NP and that PP are both arguments, as in (24). (Recall that we use two entries in lieu of parenthesizing an argument.)

(23)


DS: [NP] fell [NP the acrobat]
AS: [a]
fall
CS: [BECOME ([THING] , [PLACE])]

(24)


DS: [NP] fell [NP the acrobat] [PP into the net]
AS: [a a]
fall
CS: [BECOME ([THING], [PLACE])]

Rather, our theory predicts that when the optional PP is present the NP will fail to link, and consequently fail the argument tests; when the PP is absent, the NP should pass the tests. These predictions hold.

(25) Nominal Formation

a. The falling of acrobats (*into nets) is a rare occurrence.
The sinking of treasure (*to the bottom of the sea) inspires diving expeditions.

b. The changing of tadpoles (*into frogs) takes some time.
(cf. Tadpoles changing into frogs takes some time.)

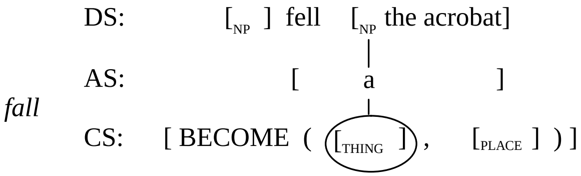
(26) Adjectival Passive Formation

a. His face seemed fallen after he heard the bad news.
The acrobat appeared fallen (*into the net)
The treasure remained sunken (*to the bottom of the sea) for years

b. The tadpoles seemed changed (*into frogs)

Thus the representations of these verbs are not (23) and (24) but (27), with the optional PLACE implicit and (28), with the PLACE expressed:

(27)


DS: [NP] fell [NP the acrobat]
AS: [a]
fall
CS: [BECOME ([THING] , [PLACE])]

(28) DS: [$_{\text{NP}}$] fell [$_{\text{NP}}$ the acrobat] [$_{\text{PP}}$ into the net]

AS: [a]

fall

CS: [BECOME ([$_{\text{THING}}$] , [$_{\text{PLACE}}$])]

And, as predicted, NF can apply when only the PLACE is expressed, since only then is the PLACE an internal argument of the verb.

(29) This falling into nets has got to stop.

8.3 Unaccusative Pseudoresultatives: *break (into pieces)*

We first analyzed the *break*-class verbs in (30a) in Chapter 4, Section 1.3.3 and Chapter 7, Section 2.3 as “pseudoresultatives,” with CSs parallel to resultatives. These verbs have unaccusative variants, in (30b). As we discussed in Chapter 4, what makes a verb a pseudoresultative and not a true resultative is that it specifies a result even when it occurs without a result XP. *Break* entails broken, but *water* does not entail flat.

(30) a. She *broke* the stick (into short pieces).
The sun *melted* the ice-cream (into mush).
The frigid temperatures *froze* the pond (rock-solid).
The usher *opened* the theatre doors (wide).
The cold air *flattened* the soufflé (into a pancake).

b. The stick broke (into short pieces).
The ice-cream melted (into mush).
The pond froze (rock-solid).
The theatre doors opened (wide).
The soufflé flattened (into a pancake)

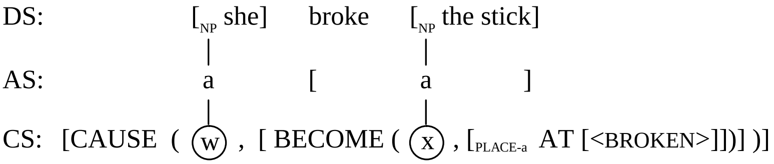
When we first distinguished the (30b) unaccusative forms (without XPs) from unergatives in Chapter 3, Section 4, we noted that they fail the *-er* test and form good adjectival passives, Thus their single argument must be internal, not external:

(31) a. *These thin sticks are real breakers.
*This ice-cream bar is a slow melter.
*Large ponds are slower freezers than small ones.

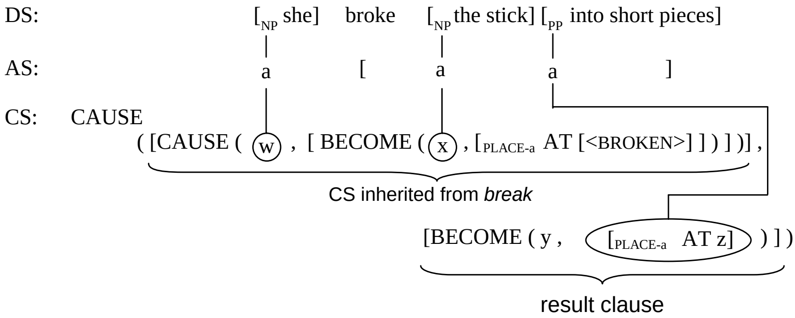
b. a broken stick
melted ice-cream
a frozen pond

At that point, we assigned them the same basic CSs as the unaccusative verbs that we just reanalyzed. But, in fact, these *break* unaccusatives are different from those. Our analysis of these verbs is based on their transitive counterparts, in (30a). The version without a PP (*She broke the stick*) has the CS in (32) with two linking arguments; the version with the PP (*She broke the stick into pieces*) has the CS in (33) with three arguments. And recall that (33) does not cause a PADF violation, despite having three arguments, because of its complex CS geometry.

(32) transitive *break*

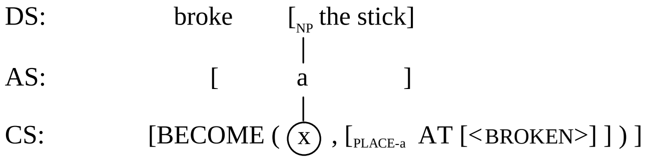

DS: [NP she] broke [NP the stick]
AS: a [a]
CS: [CAUSE (w , [BECOME (x , [PLACE-a AT [<BROKEN>]])])]

(33) transitive *break*+ PP

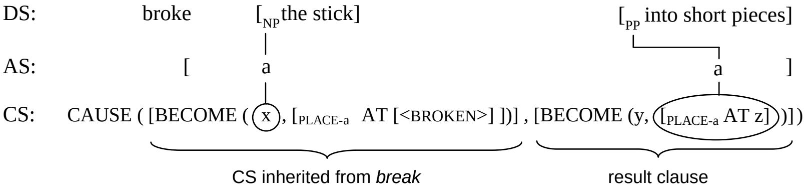

DS: [NP she] broke [NP the stick] [PP into short pieces]
AS: a [a a]
CS: CAUSE
([CAUSE (w , [BECOME (x , [PLACE-a AT [<BROKEN>]])])] ,
CS inherited from break
[BECOME (y , [PLACE-a AT z])])
result clause

We propose that the intransitives in (30b) have parallel CSs, minus the CAUSE component and its agent argument. The version without a PP (*the stick broke*) has the CS in (34) with one internal argument; the version with a PP (*the stick broke into short pieces*) has the CS in (35), with two internal arguments.

(34) intransitive *break*



(35) intransitive *break*+ PP


DS: broke [NP the stick] [PP into short pieces]
AS: [a a]
CS: CAUSE ([BECOME (x , [PLACE-a AT [<BROKEN>]])] , [BECOME (y, [PLACE-a AT z])])
CS inherited from break
result clause

Recall that the CS in (33) was motivated by the evidence showing that the theme argument links **even in the presence** of a linking PLACE argument. Similarly, for the non-agentive, unaccusative, versions, adding the XP to the adjectival passives in (31b) does not degrade their grammaticality, as shown in (36), by both adjective tests: prenominal position and complement to seem/appear.[8] And the nominals readily take XPs as well, as shown in (37).

(36) Adjectival Passive Formation (non-agentive readings)

a. The iceberg appeared broken into bits.
The ice-cream remained melted into mush.
The pond seemed frozen solid.

b. the frozen-solid pond

(37) Nominal Formation (non-agentive readings)

the breaking of icebergs into bits . . .
the melting of ice-cream into mush
the freezing of ponds (rock-)solid

This confirms that our linking proposal for the intransitive *break* class in (34) is correct. Intransitive *break* obeys the ILH and, like the causative version of this verb reanalyzed in Chapter 7, it causes no PADF violation.

8.4 Unaccusative Resultatives

In our discussion of resultatives in Chapter 6, Section 4.3, we introduced, but postponed analyzing, unaccusative resultatives such as (38).

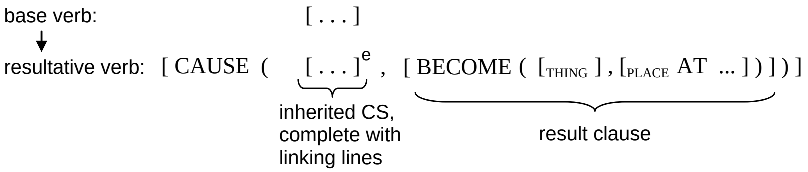
(38) a. [The boulders]$_i$ rolled [t]$_i$ smooth.
b. [The toast]$_i$ burned [t]$_i$ black.
c. [My tooth]$_i$ wiggled [t]$_i$ loose.
d. [The rope]$_i$ twisted [t]$_i$ taut.
e. [The laundry]$_i$ dripped [t]$_i$ dry.

These are similar to the pseudoresultatives in (30b) and (35) in that the CS and linking lines of the input verb are inherited to create the new verb. Here, this is accomplished by our rule of Resultative Formation (RF), which also adds an "extent" interpretation to the inherited portion of the CS:

---

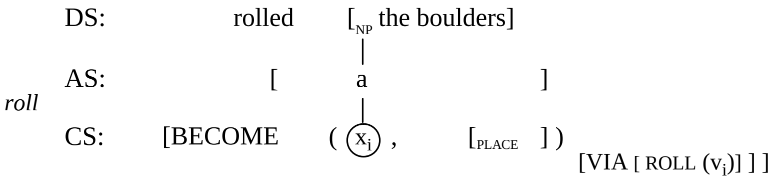
[8] To distinguish these from the transitive cases, whose agents are suppressed by these rules, we have used examples whose pragmatics resist a transitive reading. To test Adjectival Passive Formation, we are relying primarily on the seems/appear test in (a) since the prenominal adjective test in (b) works only when the XP complement is a single word.

(39) Resultative Formation (RF):


base verb:
[. . .]
resultative verb: [CAUSE ([. . .]e , [BECOME ([THING] , [PLACE AT ...])])]
inherited CS, complete with linking lines
result clause

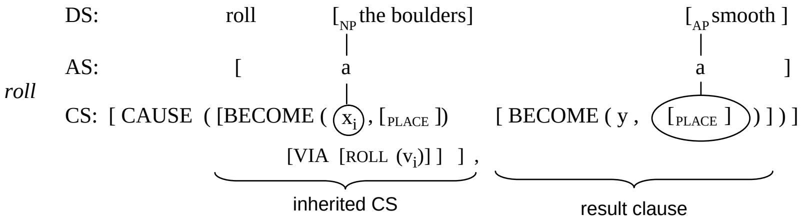
Intransitive unaccusative *roll* has the CS in (40). (Note that this is jackendoff's "Means CS" and we will justify using in the next section.)

(40)



The only linking argument, x, links internally because x is at the same hierarchical level as PLACE, in the same CS Domain. The lower argument, v, which is coindexed with x, does not link, in accordance with the Bound Argument Condition, which permits only the higher of two coindexed arguments to link. When RF applies to this verb, as shown in (41) and in tree notation in (42), it embeds this CS as the first argument of a higher CAUSE function, and inherits its one linking line. A second linking line connects the result state with a second internal argument. But, crucially, there is no linking line from y to an AS position, because of the Prohibition Against Double Fusion. As we saw for *threadbare* in Chapter 6, example (9), if y linked, it would be fusing into the same position in CS as the external argument of *smooth*.[9]

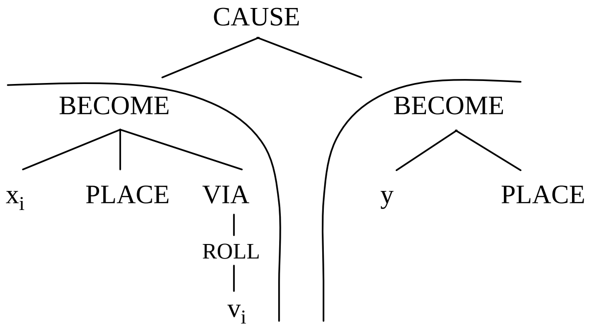
(41)


DS: roll [NP the boulders] [AP smooth]
AS: [a a]
roll
CS: [CAUSE ([BECOME (xi , [PLACE]) [BECOME (y , [PLACE])])]
[VIA [ROLL (vi)]]] ,
inherited CS
result clause

---

[9] The VIA function in (41) and (42) is meant to roughly suggest the manner of motion for *roll*, which distinguishes it from other locomotion verbs, like *swim* or *skip*. Jackendoff (1990, p. 88) suggests that such distinctions belong outside of Conceptual Structure in a more detailed "spatial structure encoding," linked via the lexicon. We are not taking a stand either way on this issue or on how VIA is attached, which we represent in Jackendoff's terms as a "superordinate function," (parallel to BY in his Means analysis of resultative verbs. See Chapter 6, Section 4, above and Jackendoff, 1990, chapter 10).

(42)



In calculating how the arguments inside the two BECOME clauses link, because they are in different CS Domains, their linking lines are determined independently. So whether the new linking PLACE argument is at the same level as x or not (here, it happens to be), it, too, will link internally, since it, like x, has a (non-linking) CS sister, y, within its CS Domain.

The output of linking gives unaccusative resultatives, like transitive resultatives (but unlike unergative resultatives), two internal arguments. Our tests for the argumenthood of the DS postverbal NP confirm this: Nominal Formation, Adjectival Passive Formation and Middle Formation all yield good outputs. (All should be interpreted with no implicit agent.)

(43) Nominal Formation

a. the rolling of boulders smooth
b. the burning of toast black
c. the wiggling of nails loose
d. the twisting of ropes taut
e. the dripping of clothes dry

(44) Adjectival Passive Formation

a. the rolled-smooth boulders
b. the burned-black toast
c. the wiggled-loose nails
d. the twisted-taut ropes
e. the dripped-dry clothes

(45) Middle Formation

a. Basalt boulders roll smooth more readily than granite ones.
b. White toast burns black more readily than whole wheat.
c. Nails in heavily used stairs wiggle loose easily.
d. Cotton ropes twist taut more easily than nylon ones.
e. Polyester clothes drip dry more easily than cotton clothes.

The interpretation of the unlinked y in (41) is derived just as in other resultatives. The CS of the linking argument of *smooth*, *the boulders,* fuses with that predicate's external argument position as shown in (46). And the output of that fusion then fuses with the CS of the verb, as shown in (47).

(46)
DS: . . . [$_{\text{NP}}$ the boulders] [$_{\text{AP}}$ smooth]
AS: a [ ]
smooth
CS: [BECOME ([$_{\text{THING}}$] , [$_{\text{PLACE-a}}$ AT <SMOOTH>])]
↓
fusion
↓
CS after fusion: [BECOME ([$_{\text{THING}}$ THE BOULDERS] , [$_{\text{PLACE-a}}$ AT SMOOTH])]

(47) **Clausal Fusion** (unaccusative resultatives)

, [BECOME ([$_{\text{THING}}$ THE BOULDERS], [$_{\text{PLACE}}$ AT SMOOTH])])]
↓ ↓

resultative roll CS: $[\text{CAUSE}\ (\underbrace{[\ ...\ ]}_{\text{inherited CS}})^e$, [BECOME ([$_{\text{THING}}$], [$_{\text{PLACE}}$ AT . . .])])]
↓ ↓

$[\text{CAUSE}\ (\underbrace{[\ ...\ ]}_{\text{inherited CS}})^e$, [BECOME ([$_{\text{THING}}$ THE BOULDERS], [$_{\text{PLACE}}$ AT SMOOTH])])]

The "inherited CS" is spelled out on the top line of (48), the CS for the whole sentence.

(48) [CAUSE

$$(\ \underbrace{[\ \text{BECOME}\ (x_i\ ,\ [_{\text{PLACE-c}}\ ]\ )^e\ \ [\text{VIA}\ \ [\text{ROLL}\ \ (v_i)\ ]\ ]\ ]}_{\text{1st argument of CAUSE = CS inherited from } roll}\ ,$$

$$\underbrace{[\text{BECOME}\ ([_{\text{THING}}\ \text{THE BOULDERS}],\ [_{\text{PLACE}}\ \ \text{AT SMOOTH}]\ )\ ]\ )\ ]}_{\text{2nd argument of CAUSE = result clause}}$$

Ultimately, the two fusion operations will fuse the CS of *the boulders* in two separate places in the CS of the sentence. In (47), under Clausal Fusion, when the CS of *smooth* fuses with the CS of the verb, the CS of *the boulders* ends up fusing with y, the THING in the BECOME clause on the bottom line of (48). On the top line, another instance of the CS of *the boulders* will fuse with x in the inherited CAUSE clause, because *the boulders* also satisfies an internal argument position in *roll*'s AS. This is shown in (49), where fused arguments replace x_i and v_i and fusion is complete.

(49) [CAUSE

$$(\ \underbrace{[\text{BECOME}\ (\ [_{\text{THING}}\ \text{THE BOULDERS}]\ ,[_{\text{PLACE-c}}\ \ ]\ )^e\ [\text{VIA}\ \ \text{ROLL}\ ([_{\text{THING}}\ \text{THE BOULDERS}\ ])]\ ]}_{\text{1st argument of CAUSE = CS inherited from } roll}\ ,$$

$$\underbrace{[\text{BECOME}\ ([_{\text{THING}}\ \text{THE BOULDERS}],\ [_{\text{PLACE}}\ \ \text{AT SMOOTH}]\ )\ ]\ )]}_{\text{2nd argument of CAUSE = result clause}}$$

So, these verbs, just like the other resultatives we have seen, conform to the ILH and avoid violating the PADF.

8.5 Unaccusative / Unergative Alternating Verbs: *roll* and *march*

In the previous section, we looked at how unaccusatives like *roll* (*burn*, *wiggle*, *twist*, *drip*) behave with respect to Resultative Formation. But other aspects of these verbs also deserve a look. One subset, the "manner of motion" verbs like *roll* and *wiggle*, in fact, alternate between two intransitive forms. In addition to the unaccusatives in (50a), which have inanimate, non-volitional subjects, are the unergative forms with volitional subjects in (50b).

(50) a. Unaccusative verbs
The boulders rolled.
The ball bounced.
The floorboard wiggled.
The gems tumbled.

b. Unergative verbs
Max rolled.
The gymnast bounced.
The bellydancers wiggled.
The children tumbled.

And the two alternates behave differently in our tests. Unlike the unaccusatives in (50a) which, as we saw, form resultatives as in (51a), the verbs in (50b), like other unergatives, require a "dummy" postverbal NP at DS to provide the predicate with a local subject (Carrier & Randall, 1992), as in (51b).

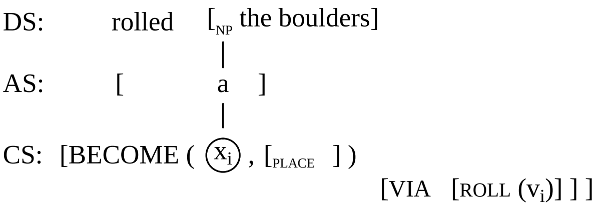
(51) a. Unaccusative resultatives
The boulders rolled (*themselves) smooth.
The ball bounced (*itself) smooth.
The floorboard wiggled (*itself) loose.
The gems tumbled (*themselves) shiny.

b. Unergative resultatives
Max rolled himself dizzy.
The bellydancers wiggled themselves sore.
The gymnast bounced the balls of her feet sore.
The children tumbled themselves to exhaustion.

This difference coincides with a difference in CS, and leads to the following question: how can one verb link in two different ways?

In our CS for unaccusative *roll* in (40), repeated in (52), there is an implicit PLACE. In other words, even without a locative PP in the syntax, we claimed that the core meaning of unaccusative *roll* is change-of-location. Given that this implicit PLACE is a sister of x in the CS, x must link internally.

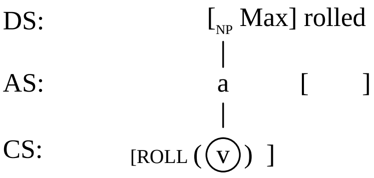
(52) Unaccusative *roll*



The CS in (52) parallels the CS of unaccusative *fall* in (27), above, but with an additional VIA clause to express manner of motion. With this VIA clause we are coincidentally assigning the unaccusative *roll* class the “Means CS” that Jackendoff (1990) attributed to resultatives and that (in Chapter 6, Section 4) we rejected for those verbs.[10,11]

In contrast, the CSs of the unergatives in (50b) must have an external argument, as we claimed in Chapter 3, Section 4.2. Though the CS is actually more complex, (53) is our short-hand version, which retains the relevant external linking. In contrast to unaccusative CSs, in unergatives, the focus is on the activity; the argument, v, is an actor. (Note that we are not equating “actor” with agent, which for us is the first argument of a CAUSE predicate.)[12]

(53) Unergative *roll*



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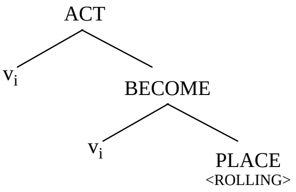
[10] In fact, one other CS is compatible with the PP-variant but it cannot surface because it violates syntactic conditions. We postpone discussing this variant until the next section.

[11] This analysis is an improvement on Randall et. al. (2004), which characterizes the CSs for both animate and inanimate *roll* as containing BECOME (referred to there as INC BE).

[12] The unabbreviated CS in Chapter 3, Section 4.2 for unergative verbs contains ACT with the manner in the PLACE argument as in (i):

(i)



In support of this, notice that animate *roll* passes the Actor test, but inanimate *roll* does not:

(54) a. What Max did was roll.
b. *What the boulders did was roll.

The *-er* test for unergatives, in (55), also confirms the unergative status of the cases with animate subjects, in (55b) in contrast to the unaccusative status of the cases with inanimate subjects, in (55a).

(55) a. *Those boulders are real rollers!
*That ball is a real bouncer!
*The floorboards are real wigglers!
*Those gems are amazing tumblers!

b. That child Max is a real roller!
That gymnast is a real bouncer!
Those bellydancers are real wigglers!
Those children are amazing tumblers!

Notice that, in fact, the (50b) cases have a second reading in which the argument is simply a theme that the event happens to, as originally observed by Gruber (1965) and Jackendoff (1972). For this interpretation, the CS would in fact be (52). But this does not eliminate the need for the unergative CS in (53) for the voluntary interpretation of these verbs. In what follows we will focus on the volitional unergative readings of the verbs in (50b) and stick to inanimate subjects for unaccusative cases.

There is one other set of verbs that fit into the picture. Another set of manner-of-motion verbs, in (56), do not alternate like *roll*. Since marching and dancing can **only** be done volitionally, they have only the unergative pattern and, we claim, only the CS parallel to (53), in (57) (again, we are using an abbreviated CS):[13]

(56) a. They marched.
b. They danced.
c. She ran.
d. We skipped.
e. We swam.

(57) [MARCH (v)]

This is confirmed by their behavior on Resultative Formation: they all require a postverbal dummy NP.

(58) a. They marched *(themselves) sober.
b. They danced *(their feet) blistery.
c. She ran *(her sneakers) ragged.
d. We skipped *(ourselves) sweaty.
e. We swam *(ourselves) sick.

---

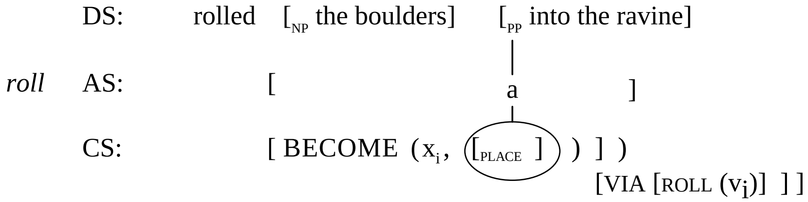
[13] Except when these verbs are used figuratively, as in *time marches on* or *the snowflakes danced on the windshield*.

Let us now return to how these alternating unaccusative/unergative verb classes link when their optional PLACE argument is present in a PP. The unaccusative, inanimate *roll*-class is shown in (59).

(59) The boulders rolled into the ravine.
The ball bounced onto the court.

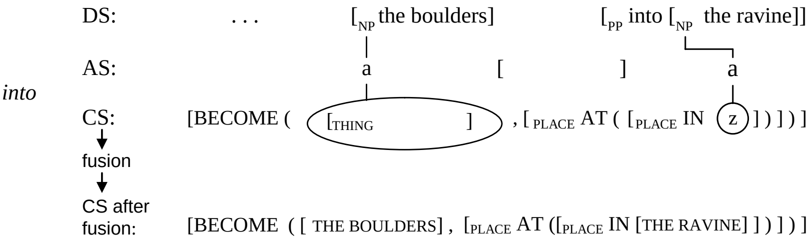
According to the PADF, these verbs should behave like *fall* in (27) and (28), which links its PLACE as an argument of the verb only when its theme is not linked. And as shown in (60), when the PP is present, the argument that this verb links is the PLACE.

(60)


DS:
rolled $[_{NP}$ the boulders] $[_{PP}$ into the ravine]
roll
AS:
[a]
CS:
[BECOME (x_i, $[_{PLACE}$])])
[VIA [ROLL (v_i)]]]

The CS of the theme in the verb's CS, x_i, is filled in when the CS of the preposition, *into*, in which this theme is the external argument, fuses with the CS of the verb.

(61)


DS:
. . . $[_{NP}$ the boulders] $[_{PP}$ into $[_{NP}$ the ravine]]
AS:
a [ ] a
into
CS:
[BECOME ($[_{THING}$] , $[_{PLACE}$ AT ($[_{PLACE}$ IN z])])]
fusion
CS after fusion:
[BECOME ([THE BOULDERS] , $[_{PLACE}$ AT ($[_{PLACE}$ IN [THE RAVINE]])])]

And when x_i fuses with [THE BOULDERS] in (60), so does v_i, coindexed with it. So like *go, fall, break* and many of the other verbs we have reanalyzed in this chapter (both causative and unaccusative), in accordance with the PADF, when the PLACE is an argument, the theme is not.

Now what about unergative *roll* when it appears with a PP? What is the CS of the forms in (62)?

(62) Max rolled down the hill.
The gymnast bounced off the trampoline.
The campers wiggled into sleeping bags.
The baseball players slid to home plate.

We propose that these have the *same* CS as their inanimate counterparts in (59), namely (60). Though without an argument PP these verbs are unergative, when one is added, they shift to unaccusative. The focus is on the change-of-location, not on the manner of motion. And we propose that the same is true for the *march* verbs, in (56). Though without an argument PP, they have only the unergative possibility, when they add one, they, too, shift to unaccusative.

Our tests confirm this, for both classes. First, while *-er* affixation is predictably grammatical for the bare variants, which can take non-argument adjunct PPs, as in (63), in the presence of an argument PP, here a directional, they are ungrammatical, as shown in (64):

(63) a. the rollers (in the aisles)
the bouncer (near the trampoline)
the wiggler (in the sleeping bag)
the slider (at home plate)

b. the marchers (in the town)
the dancer (on the stage)
the runner (across the finish line) (location not direction)
the skipper (in the playground)
the swimmer (at the deep end of the pool)

(64) a. *the roller down the hill
*the bouncer off trampolines
*the wiggler into the sleeping bag
*the slider to home plate

b. *the marchers into the town
*the dancer onto the stage
*the runner across the finish line (on directional interpretation)
*the skipper to the bank
*the swimmer to the deep end of the pool

Second, the argument PP variants in (62) fail the NF and APF tests because for these, the postverbal NP is not an argument of the verb.[14] (Bear in mind that we are testing the non-causative interpretations.)[15]

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[14] As mentioned in Section 1, above, we have been omitting Middle Formation as a test with unaccusative verbs because the judgments are very subtle. But to us the middle sentences sound ungrammatical, as predicted.

(i) *These children roll downhill easily.
*The gymnasts bounce onto trampolines easily.
*These campers wiggle into sleeping bags easily.
*Some baseball-players slide to home plate easily.

(ii) *Some troops march into towns easily.
*Some performers dance onto the stage easily.
*Not all contestants run across finish lines easily.
*Rabbits skip to riverbanks easily.
*These children swim to the deep end easily.

(65) **Nominal Formation**

a. *the rolling of children down hills
*the bouncing of gymnasts off trampolines
*the wiggling of campers into sleeping bags
*the sliding of baseball-players to home plate

b. *the marching of troops into towns
*the dancing of performers onto stages
*the running of contestants across finish lines
*the skipping of rabbits to riverbanks
*the swimming of children to the deep end of the pool

(66) **Adjectival Passive Formation**

a. *the rolled-downhill children
*the bounced-off gymnasts
*the wiggled-loose Houdini-imitator
*the slid-home baseball player

b. *the marched-away troops
*the danced-in performers
*the run-home contestant
*the skipped-free rabbits
*the swum-home children

Given this, we propose that the CS for *march* with a PP argument is (67).

(67) DS: [$_{\text{NP}}$ the troops] marched [$_{\text{PP}}$ into the town]

march + PP AS: [a]

CS: [BECOME (x_i , $\boxed{[_{\text{PLACE}}\ ]}$)])
[VIA $\underbrace{[\text{MARCH } (v_i)]}_{\text{inherited CS}}$]]

Note that it is not the additional condition on MF that is the source of ungrammaticality: though they are arguments of the preposition and not the verb, the d-structure postverbal NPs do correspond to themes of these verbs.

Note also that, as in all of our earlier tests using Adjectival Passive Formation, we have changed the inputs to APF to fulfill the requirement that the incorporated element be a single word. (The requirement is the same as the requirement on Passive Compound Formation; see Chapter 7, note 6).

[15] Note that these are grammatical if their source is a transitive causative verb, e.g., *the general marches the troops into towns, the coach swims the children to the deep end of the pool (every day).* In fact, we show below that these grammatical readings are predicted, because for each of those cases the postverbal NP is an argument of the verb.

Note that the shift from unergative to unaccusative is not only described but is forced by our linking theory. The PLACE in the higher BECOME clause links to an internal AS position which, in turn, is satisfied in the syntax by the directional argument PP. But just as with *go* in Section 1 of this chapter, the directional PP in (67) is also itself a predicate, which needs a local subject. Thus, the surface subject of *the troops marched into the town* must be in postverbal position at DS.[16]

The shift of manner-of-motion verbs from unergative, as in (50a), to unaccusative in the presence of a directional PP, as in (62), has been widely discussed in the literature (Levin & Rappaport-Hovav, 1995; Borer, 1994; Juarros, 2003; among others). But in most accounts, the shift must be stipulated. Levin & Rappaport, for example, handle the shift with a linking rule that refers to a specific thematic role. Their Directed Change Linking Rule requires an argument that undergoes "a directed change specified by the verb" to be realized as a direct internal argument. Translated into our terms, the first argument of BECOME must be an internal argument of the verb. By stipulation, their Directed Change Linking Rule overrides their Agent Linking Rule, which would otherwise link the sole argument of a manner-of-motion verb as an external argument. In *Leo swims*, for example, *Leo* is the agent and therefore an external argument. But in *Leo swam to the dock*, *Leo* is the agent and also the theme (i.e., the argument that undergoes a directed change). The Directed Change Linking Rule, now in competition with the Agent Linking Rule, wins, but only by stipulation.

We agree that in *Leo swam to the dock*, *Leo* is both the theme and the agent. It corresponds to x_i and v_i in the CS in (67). However, our linking rules do not need to refer to specific thematic roles, nor are they ordered with respect to each other. Our explanation of the unergative-unaccusative shift follows from a geometric property of CS. The independently needed locality condition on predication is sufficient to

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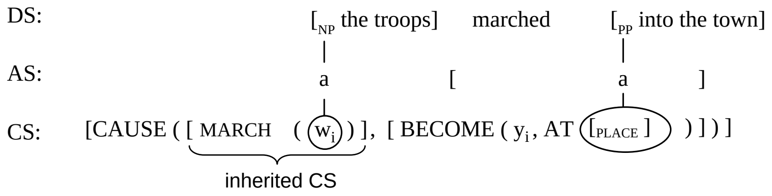
[16] Consider an alternative analysis of these verbs that relates them to their unergative bases. Instead of (67), suppose that their CS were parallel to the CS of resultatives (minus the extent requirement), as in (i), paraphrased as "the troops' marching got them to be in the town."

(i)



Such a verb could never survive in the syntax. Consider the linking: w inherits its external linking line. PLACE links internally. y cannot link, because of the PADF. The problem is that the NP, *the troops*, is not a local subject for the predicate, *into the town*. To be local, it must originate in DS postverbal position and therefore must be linked internally. Notice that this CS is possible when the locality condition is satisfied with a reflexive or body-part XP, as in *the baby bunnies skipped themselves over to the riverbank* or *the general said: "march your asses into town"*. We will see such cases in Chapter 9.

ensure that in the PP-variant the surface subject originates in postverbal position at DS. We depart further from Levin & Rappaport in claiming that this NP is not an argument of the verb. That is, the PADF predicts that in the BECOME clause of (67) x cannot link, given that the PLACE does.

At this point the reader may find it curious that we refer to an unergative-unaccusative shift for verbs like *march* and *swim*, and that we continue to call the PP-variants of these verbs unaccusative, even though the theme (the postverbal NP that moves) is not an argument. Before looking at any more classes of verbs, we turn briefly to discuss exactly what we mean by the term “unaccusative verb”.

8.6 Defining “Unaccusative Verb”

Since Perlmutter (1978) and Burzio (1981), unaccusative verbs have been defined as those intransitive verbs that have an underlying syntactic object that surfaces in subject position. As shown in (68), they contrast with unergatives, whose surface subject is an underlying syntactic subject. In simple GB terms (Chomsky 1981 and subsequent work), an unergative takes a theta marked DS subject and no object, while an unaccusative takes a theta marked DS object.

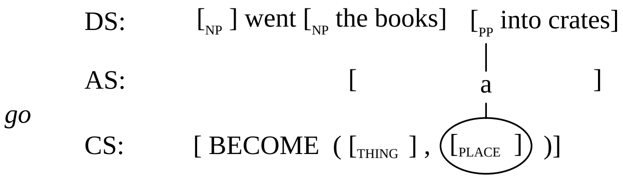
(68) a. NP [$_{\text{VP}}$ V] unergative *Leo swim*s.
b. [$_{\text{VP}}$ V NP] unaccusative *Leo fell.*

Now, an entity that a verb “theta marks” is its argument. So, under this definition, unaccusatives are those verbs that have an internal argument and no external argument, the internal argument moving to subject position. Moreover, it has sometimes been assumed that this argument must be a “direct” internal argument. But in Chapter 2, Section 1, we showed that the direct/indirect internal argument distinction is unnecessary. And we have also demonstrated – for resultatives in Chapter 5, Section 2 and for several other verb classes in this chapter – that a verb can have a postverbal NP which is not necessarily its argument.

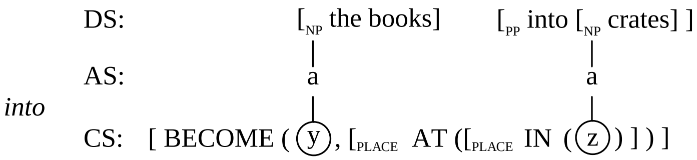
We are going to argue for a different definition of unaccusativity, rejecting the idea that an unaccusative is simply a verb with an internal argument and no external argument. We will discuss four types of verbs, all of which have been reanalyzed earlier in this chapter, and all of which, we will claim, are unaccusative.

The first type, *go*, in (69), discussed in Section 1, above, requires an NP and a PP. The PP is an internal argument of the verb but the NP is not an argument of the verb at all. It is the external argument of the head of the PP, as shown for *into* in (70).

(69)

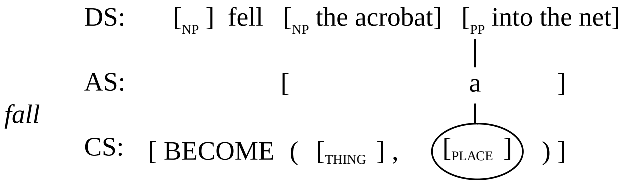

DS: [$_{\text{NP}}$] went [$_{\text{NP}}$ the books] [$_{\text{PP}}$ into crates]
AS: [a]
go
CS: [BECOME ([$_{\text{THING}}$] , [$_{\text{PLACE}}$])]

(70)

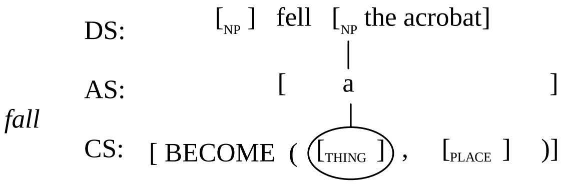

DS: [NP the books] [PP into [NP crates]]
AS: a a
into
CS: [BECOME (y , [PLACE AT ([PLACE IN (z)])]

The second type, *fall* and *change*, from Section 2 of this chapter, take an NP and an optional XP PLACE argument. When the PLACE appears, as in (71), it is an argument of the verb and the NP is not, parallel to *go*. When the PLACE is absent, as in (72), the NP is the argument of the verb.

(71)

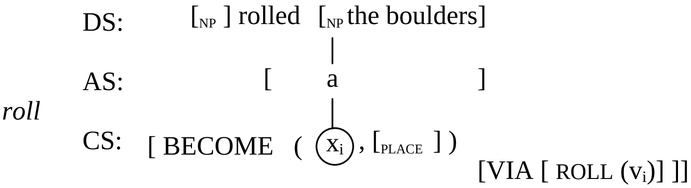

DS: [NP] fell [NP the acrobat] [PP into the net]
AS: [a]
fall
CS: [BECOME ([THING] , [PLACE])]

(72)


DS: [NP] fell [NP the acrobat]
AS: [a]
fall
CS: [BECOME ([THING] , [PLACE])]

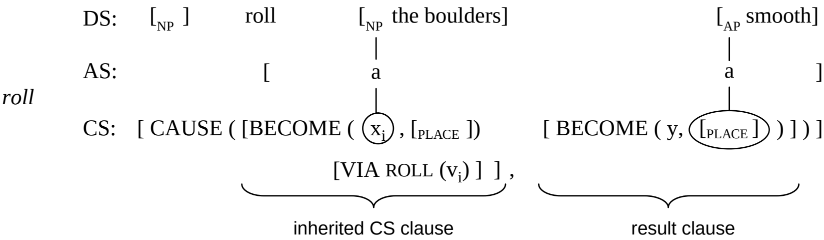
Unaccusative verbs like *roll* in *the boulders rolled*, discussed in Sections 4 and 5 of this chapter, with the CS in (73), have one internal argument. In terms of types of unnaccusatives, they are identical to (72).

(73)


DS: [NP] rolled [NP the boulders]
AS: [a]
roll
CS: [BECOME (xi , [PLACE])
[VIA [ROLL (vi)]]]

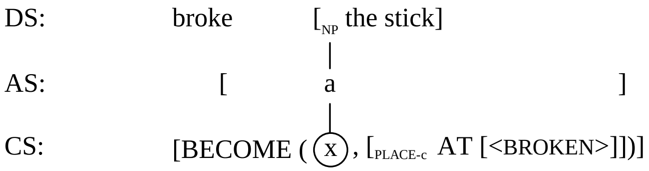
These verbs, though, can be input to Resultative Formation, which produces *the boulders rolled smooth*. Resultative *roll*'s CS is thus a third type of unaccusative, with two internal arguments as in (74):

(74)


DS: [NP] roll [NP the boulders] [AP smooth]
AS: [a a]
roll
CS: [CAUSE ([BECOME (xi , [PLACE]) [BECOME (y, [PLACE])])]
[VIA ROLL (vi)]] ,
inherited CS clause
result clause

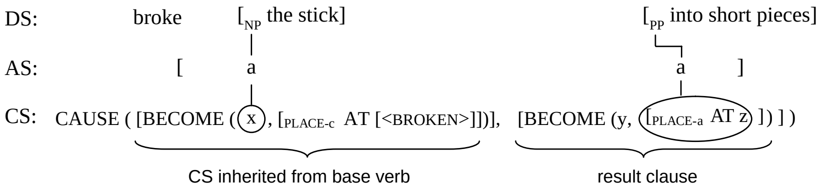
In Section 3 of this chapter, we reanalyzed *break*. Basic *break* in (75) without a PP is parallel to *fall* but it has a selectional restriction on its PLACE. As with *fall*, when its PLACE fails to link and the PP is absent, the theme is an argument.

(75)



But when the PP appears, the CS is more complex as in (76). In Chaper 7, Section 2.3, we called this type of verb a “pseudoresultative.” It is our fourth type of unaccusative verb.

(76)


DS:
broke
[NP the stick]
[PP into short pieces]
AS:
[
a
a
]
CS:
CAUSE ([BECOME (x , [PLACE-c AT [<BROKEN>]])], [BECOME (y, [PLACE-a AT z])])
CS inherited from base verb
result clause

How can we justify classifying all of these verbs as unaccusative? Let us go back to the classic definition of unaccusativity. According to Burzio (1986), unaccusative verbs are those verbs that do not assign a theta-role to their subject and do not assign case to their postverbal NP. To get case, the postverbal NP moves to subject position. Notice that this characterization does not refer to the argument status of the postverbal NP. So **whether or not the postverbal NP is an argument of the verb**, and whether or not there is another internal argument, this definition of unaccusativity, applies. We state it explicitly in (77):

(77) **Unaccusative verb**: A verb whose surface subject originates in DS postverbal position, regardless of whether it is an argument of the verb.

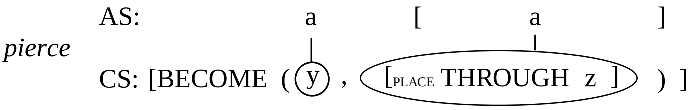
8.7 Unaccusative/Causative Alternating Verbs: *pierce* and *climb*

With this definition of unaccusativity in hand, let us look at two other alternations involving unaccusative verbs. *Pierce* in (78), as discussed by Gruber (1965) and Jackendoff (1985), fits two syntactic frames. In (78a), the “PP variant”, the postverbal XP corresponds to a PLACE in CS. In (78b), the “NP variant”, it corresponds to a THING.

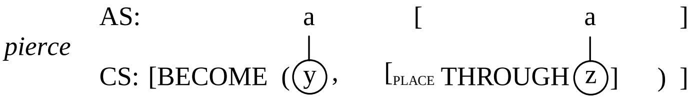
(78) a. The arrow pierced [$_{PP}$ through the bullet-proof vest].
b. The arrow pierced [$_{NP}$ the bullet-proof vest].

Jackendoff (1985) proposes to collapse the two uses of such verbs into one lexical entry. He assumes that they share a single CS, but that the entry encodes two linking options: either the entire PLACE links or the THING inside the PLACE links. These two options are shown separately in the two entries in (79) and (80).

(79)



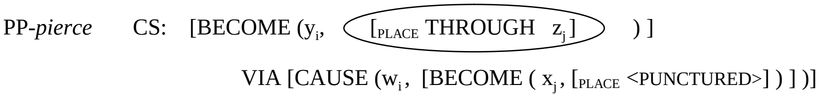
(80)



In (80), when the THING, z, option is chosen, the internal argument must be satisfied by an NP (since THING CSs are generally expressed by nouns) and the PLACE function (with its [THROUGH] selectional restriction) is incorporated into the meaning of the verb. In (79), when the PLACE option is chosen, an XP designating a PLACE is selected, most likely a PP (since PLACE CSs tend to be expressed by prepositions). And if these were the correct representations for *pierce*, the ILH would make the right predictions: PP-*pierce* would link like *go* and NP-*pierce*, like *enter*.

Our representations for the two forms of *pierce* in (78), however, differ in more ways than these, based on a difference in their meanings. (78a) indicates that the arrow actually *went through* the bullet-proof vest. So PP-*pierce* is a change-of-location verb, as depicted in (81). In contrast, (78b) means that the arrow simply punctured the vest, regardless of whether it went anywhere. (In fact, the arrow could have stayed stationary, and the vest could have moved close enough to the arrow to create the puncture.) So NP-*pierce* is a causative change-of-state verb, as depicted in (82). Its CS is identical to the VIA clause in the CS of PP-*pierce*.

(81)


PP-pierce CS: [BECOME (yi, [PLACE THROUGH zj])]
VIA [CAUSE (wi, [BECOME (xj, [PLACE <PUNCTURED>])])]

(82) NP-*pierce* CS: [CAUSE (w, [BECOME (x, [$_{\text{PLACE}}$ <PUNCTURED>])])]

The different syntactic realizations for *pierce* are a result of our how linking theory applies to these two distinct CSs. Starting with PP-*pierce* in (83), in the highest CS clause, the theme, y, and the PLACE are sisters, so according to the ILH, both should link internally. However, given that only the PLACE can link; y cannot.

(83) DS: pierce [$_{NP}$ the arrow] [$_{PP}$ through the bullet-proof vest]
AS: [a]
PP-*pierce*
CS: [BECOME (y_i, [$_{PLACE}$ THROUGH z_j])]
VIA [CAUSE (w_i, [BECOME (x_j, [$_{PLACE}$ < PUNCTURED >])])]

If y linked, the CS of *the arrow* would fuse twice with y – once as the internal argument of *pierce* and once as the subject (and external argument) of the head of the PP, *through*, as shown in (84), causing a double fusion violation.

(84) DS of (78a): ... [$_{NP}$ the arrow] [$_{PP}$ through [$_{NP}$ the bullet-proof vest]]
AS: a [a]
through
CS: [BECOME (y , [$_{PLACE\text{-}c}$ THROUGH z])]

Thus PP-*pierce* is predicted to be a one-argument verb, the PP its sole argument. In the syntax, *the arrow*, external argument of the preposition, must be local, therefore postverbal at DS. And like all unaccusatives, this argument will move in the syntax to its surface subject position.

In contrast, in NP-*pierce* in (85), the XPs corresponding to w and x are not in a predication relation. The arrow does not become the bullet proof vest. So both can link and the PADF is not violated.

(85) DS: [$_{NP}$ the arrow] pierce [$_{NP}$ the bullet-proof vest]
AS: a [a]
NP-*pierce*
CS: [CAUSE (w , [BECOME (x , [$_{PLACE}$ < PUNCTURED >])])]

Further, since the first argument of CAUSE is higher than the theme, the ILH predicts that it must link externally, and the theme internally. Thus, the NP-variant of *pierce* is a standard causative transitive verb.

A similar account applies to the alternating *climb* class in (86).

(86) a. The hikers climbed up the mountain.
The athletes swam across the channel.
The tourists walked along the Freedom Trail.
The joggers ran around the course.

b. The hikers climbed the mountain.
The athletes swam the channel.
The tourists walked the Freedom Trail.
The joggers ran the course.

Our CSs for these verbs are close to Jackendoff's (1985); however, as with *pierce*, we assign them distinct CSs. Unaccusative *climb* in (86a) has the CS in (87). Transitive *climb* in (86b) has the CS in (88).

(87) DS: climbed $[_{\text{NP}}$ the hikers] $[_{\text{PP}}$ up the mountain]
|
PP-*climb* AS: [a]
|
CS: [[BECOME (x$_i$, $[_{\text{PLACE}}$ AT $[_{\text{PLACE-c}}$]])]
VIA [CLAMBER (y$_i$)]]

(88) DS: $[_{\text{NP}}$ the hikers] climbed $[_{\text{PP}}$ the mountain]
| |
NP-*climb* AS: a [a]
| |
CS: [[BECOME (x$_i$), $[_{\text{PLACE}}$ AT $[_{\text{PLACE-c}}$ TOP OF (z)]]])]
VIA [CLAMBER (y$_i$)]]

Crucially, in (87) *the hikers* is neither an external nor an internal argument of the verb while in (88), *the hikers* is an external argument and *the mountain* is an internal argument.

Evidence that the representations for *pierce* and *climb* are correct comes from NF and APF, which apply to the NP variants but not to the PP variants.[17] Thus our claim that the post verbal NPs in the PP variants are not arguments of these verbs is correct.[18]

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[17] As discussed in Section 1, above, MF is a subtle test to use on unaccusative verbs, since the unaccusative reading interferes with a true middle interpretation, so we have refrained from using it. However, we find that it makes the predicted distinction, especially if the adverb is placed non-finally:

(i) NP-variant
This bullet-proof vest pierces easily.
This mountain climbs easily.
This channel swims easily.
This trail walks easily.
This course runs easily.

(ii) PP-variant
*These arrows pierce easily through bullet-proof vests.
*Hikers climb easily up mountains.
*Athletes swim easily across channels.
*Tourists walk easily along certain trails.
*Joggers run easily around this course.

[18] Notice that the ungrammatical nominals in (89b) show further that the surface subject of the PP variants (e.g., *arrow*, *hikers*) is not an external argument of the verb either, since either external or internal arguments can form grammatical *of*-NPs. (See Chapter 2, example (28).)

(89) Nominal Formation
a. NP-variant
the piercing of bullet-proof vests
the climbing of mountains
the swimming of the channel
the walking of the Freedom Trail
the running of the course

b. PP-variant
*the piercing (of arrows) through vests
*the climbing (of hikers) up mountains
*the swimming (of athletes) across channels
*the walking (of tourists) along the Freedom Trail
*the running (of joggers) around the course

(90) Adjectival Passive Formation
a. NP-variant
The vest remained unpierced.
This mountain remains unclimbed.
This channel remains unswum.
This trail remains unwalked.
This course remains unrun.

b. PP-variant
*The arrow remained pierced through the vest.
*The hikers remained climbed up this mountain.
*The athletes remained unswum across this channel.
*The last group remains unwalked along the trail.
*The joggers remain unrun around this course.

The *-er* unergative diagnostic verifies these classifications. As (91) shows, it attaches to the NP-variants, showing that they have an external argument.

(91) This arrow is a leather-piercer/ a piercer of leather.
She is a mountain-climber / a climber of mountains.
She is a channel-swimmer / a swimmer of channels.
She is a trail-walker / a walker of trails.
She is a course-runner / a runner of courses.

However, it fails to attach to the PP-variant, supporting their status as unaccusative.

(92) *That's a piercer through leather.
*He's a climber up mountains.
*She's a swimmer across channels.
*I've been a walker along the Freedom Trail.
*He's a runner around courses.

In sum, the alternating *pierce* and *climb* classes in (78) and (86) fit into our system as predicted. With an NP object, as in [*the arrow pierced the bullet-proof vest*], they are standard causative transitive verbs with two linking arguments. However, with a PP as in [*the arrow pierced through the bullet-proof vest*], they are unaccusative, with a sole linking PLACE argument, *through the bullet-proof vest*. The head of this PLACE PP, *through*, takes two arguments, the internal argument the *bullet-proof vest*, its object, and *the arrow*, its subject. Predication requires that the subject appear postverbally; it moves to subject position in the syntax, as with all unaccusatives. But here *the arrow* is not an argument of the verb, as our tests consistently show.

Chapter 9

Complex Causative Verbs

Chapter 7 analyzed two classes of causative verbs, change-of-location verbs like *put* and *deliver* and change-of-state verbs like *render* and *convert*, which all behaved in parallel – when their PLACE linked, their theme did not. That is, they were all **2-argument** verbs. This was predicted by the Prohibition Against Double Fusion given the geometry of their CSs and it was confirmed by the argumenthood tests on their postverbal NPs. At the end of Chapter 7, Section 2, we encountered a different sort of causative, *break*, whose theme linked even when its optional PLACE linked. No PADF violation occurred because its CS is more complex, similar to resultative CSs, but without the extent component.

Chapter 8, Section 3 gave a parallel analysis to the unaccusative counterparts of the transitive *break* class. *The stick broke into pieces* has two arguments, a linking theme *and* a linking PLACE, again because its complex CS geometry does not incur a PADF violation.

In this chapter, we will analyze several more classes of causative verbs similar to causative *break*. We call these verbs "complex causatives" because their theme and PLACE both link. That is, they are **3-argument verbs**, just like transitive resultatives. For this to be possible, their CS geometry must be more complex than standard causative verbs like *put*/*deliver* and *render*/*convert*. Strictly speaking, transitive *break* also fits into this category and we would be presenting it here had we not already analyzed it in Chapter 7 according to its other attributes.

In Section 1 are the causative counterparts to the unaccusative manner-of-motion verbs discussed in Chapter 8, Section 5: *march*, *dance*, *run*, *skip* and *swim* (*the general marched the soldiers into the town*). In Section 2 are what we call "material means" verbs, for example, *staple* (*I stapled the flier to the telephone pole*). In Section 3 are instrumental verbs, like *spoon* (*the chef spooned the melon balls into the bowls*). In Section 4 we reanalyze the *spray* and *load* classes (from Chapter 4, Section 2.1.3 and Chapter 6, Section 2) whose locative variants fall into the complex causative category. (Their *with*-variants do not). For all these classes of complex causatives, the CSs will link as predicted by the Isomorphic Linking Hypothesis and cause no PADF violation. But even more interestingly, for some verbs, the reanalysis will reveal – and account for – subtle ambiguities in argument structure.

J. Randall, *Linking: The Geometry of Argument Structure*, 259–280

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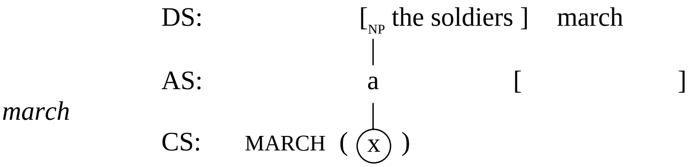
9.1 Causative Manner-of-Motion Verbs: *march, dance, run, skip,* and *swim*

Recall that according to our analysis in Chapter 8, Section 5, unaccusative manner-of-motion verbs like (1b) are derived from unergative manner-of-motion verbs like (1a).

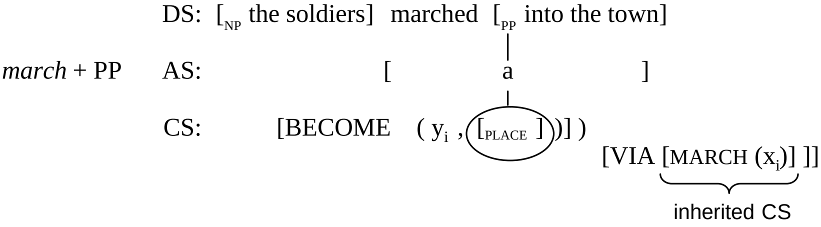
(1) a. The soldiers marched.
 b. The soldiers marched into the town.

The linking switches, following the ILH: in (1a) *the soldiers* is the external argument of *march*, as shown in (2); in the unaccusative in (1b), the PP *into the town* is an internal argument of the verb as shown in (3), and *the soldiers* is not an argument of the verb at all. It is the external argument of *into*.

(2)



(3)


DS: [NP the soldiers] marched [PP into the town]
march + PP
AS:
[a]
CS:
[BECOME (yi , ([PLACE])])
[VIA [MARCH (xi)]]]
inherited CS

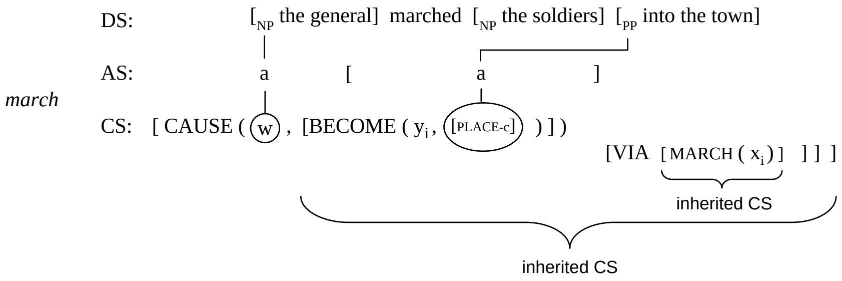
The question is how the causative versions of verbs like (1b), shown in (4), are derived.

(4) a. The general marched the soldiers into the town.
 b. Baryshnikov danced his partner off the stage.
 c. The trainer ran her dog around the track.
 d. The coach swam the children to the deep end of the pool.

One possibility is that the CS in (3) is the input to the Causative Formation rule. This rule would embed it as the second argument of CAUSE, adding an external argument, w, as the first argument of CAUSE, as shown in (5).

If this analysis turned out to be correct, then according to the PADF, since the PP linked to the PLACE in (5) is an argument of the verb, the postverbal NP could not be. Rather, it would get its interpretation as an external argument of the head of the PP, *into*.

(5)


DS:
[NP the general] marched [NP the soldiers] [PP into the town]
AS:
a [a]
march
CS:
[CAUSE (w , [BECOME (yi , [PLACE-c])])
[VIA [MARCH (xi)]]]]
inherited CS
inherited CS

But notice that our argumenthood diagnostics, Middle Formation, Adjectival Passive Formation, and Nominal Formation, in (6), (7) and (8) show that this analysis cannot be right. Since these sentences are grammatical, the postverbal NPs in (4) must be arguments of the verbs. (Remember, we are interested only in the causative versions of these forms. The intransitive versions were shown in Chapter 8, Section 5 (65)–(66) and note 14 to be ungrammatical, as predicted.)

(6) Middle Formation
  a. Lightly-equipped soldiers march to distant destinations easily.
     (meaning: someone marches them there)
  b. Shy ballerinas dance off stages easily.
     (meaning: someone dances them off stages)
  c. Well-trained dogs run around tracks easily.
     (meaning: someone (the trainer) runs the dogs around the tracks)
  d. Out-of-shape kids don't swim to the deep end easily.
     (meaning: someone (the coach) swims the kids to the deep end)

(7) Adjectival Passive Formation[1]
  a. the marched-home soldiers
  b. the run-around dogs (from *someone ran the dogs around*)
  c. the danced-offstage ballerinas

(8) Nominal Formation
  a. the marching of soldiers into towns
  b. the dancing of ballerinas off stages
  c. the running of dogs around tracks
  d. the swimming of kids to the deep end of swimming pools

So the causatives in (4) must be derived in a different way.

Suppose that the unergative in (2) is input directly to the Causative Formation rule. The output will be (9). Causative Formation adds a c-commanding agent, w, and the inherited argument, x, is delinked from its external AS position and is relinked as an internal argument. This linking would obey the ILH and not run aground on the PADF.

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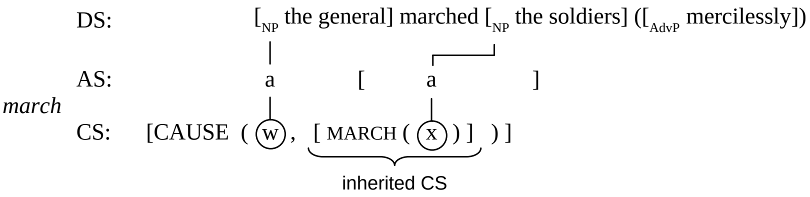
[1] The limitation that the second member of the adjectival passive be a single word makes it hard to test some of these causative verbs.

(9)

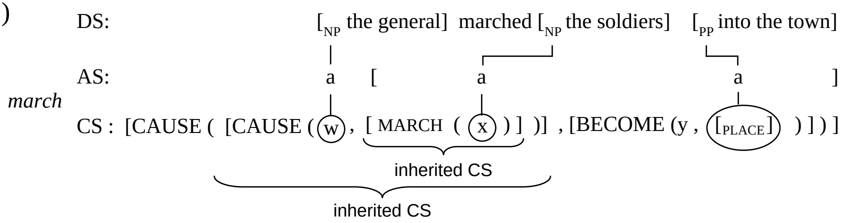

DS:
[NP the general] marched [NP the soldiers] ([AdvP mercilessly])
AS:
a [a]
march
CS:
[CAUSE (w , [MARCH (x)])]
inherited CS

Now, it has been claimed that such causative manner-of-motion verbs **require** a directional PP, even though their unergative counterparts do not (Levin & Rappaport-Hovav, 1995). We disagree and find the PP-less causatives to be grammatical, provided they are given some sort of modification.[2]

(10) a. The general marched the soldiers mercilessly yesterday.
b. The choreographer danced the ballerinas intensely at the last rehearsal.
c. The trainer didn't run the best greyhounds in the race.
d. The coach swam the team hard.

Now (9) can be the input to a rule that turns it into a change-of-location verb, as in (11).

(11)


DS:
[NP the general] marched [NP the soldiers] [PP into the town]
AS:
a [a a]
march
CS : [CAUSE ([CAUSE (w , [MARCH (x)])] , [BECOME (y , [PLACE])])]
inherited CS
inherited CS

The CS of (9) is inherited with its linking lines as the first argument of a new CAUSE function. Two arguments inherit their linking, w externally, x internally. The second argument of the higher CAUSE is a BECOME clause, whose first argument is y, and whose second argument is a PLACE, which links as an internal argument.

Under this analysis, the linking in (11) parallels the linking of transitive resultatives. As shown in (12), the CS c-command relationship between w and x means that w must link to a higher AS position than x. y and PLACE are in a different domain in the BECOME clause. Consistent with the PADF, only the PLACE in that clause links, to the second internal AS argument position. The tree in (12) illustrates this clearly.

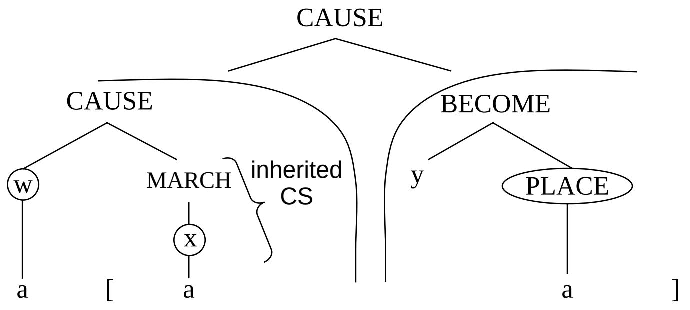
---

[2] Nothing in this framework thus far explains why this modification is necessary. But the same is true of implicit arguments, which also require modification when they are expressed, as in (i):

(i) She smiled a *(beautiful) smile.
He laughed a *(big belly) laugh.

What is crucial for us is that the modifier does not have to be a PP.

(12)



In contrast to the analysis (5), in (11)–(12) the postverbal NP corresponds to an internal argument of *march* and this explains the grammaticality of (6)–(8).

Looking at fusion, in (11) the CS of the internal argument, *the soldiers,* fuses with x. In the CS of *into,* shown in (13), two CSs fuse, the CS of *the soldiers* fuses with y, as the external argument, and the CS of *the town* fuses with z, the internal argument.

(13) DS: ... [$_{\text{NP}}$ the soldiers] [$_{\text{PP}}$ into [$_{\text{NP}}$ the town]]
AS: a [a]
into
CS: [BECOME (y), [$_{\text{PLACE-c}}$ AT ([$_{\text{PLACE-c}}$ IN (z)]])]

Although y in the verb's CS does not link as an argument of the verb, it is identified with the CS of *the soldiers* when the completed CS of *into* is fused with the CS of the verb. There is no PADF violation because the CS of *the soldiers* fuses only once with each position in the verb's CS, once in the inherited portion and once in the BECOME clause as the external argument of *into*. The difference between (11)/(4) and a transitive resultative like *the generals marched the soldiers ragged* is the lack of an extent reading in (11)/(4). But in these, as in the resultative, the postverbal NP is an argument of the verb.[3]

---

[3] Another set of causatives resemble (4) on the surface but have a CS and AS parallel to intransitive resultatives. The input is the intransitive CS in (2). A PP is added, as in (13), and the input is inherited as the "agent" of a higher CAUSE function. But unlike (4), here the postverbal NP is not an argument of the verb. The soldiers are not marching their asses.

(i) DS: [$_{\text{NP}}$ The soldiers] marched [$_{\text{NP}}$ their asses] [$_{\text{PP}}$ into the town]
AS: a [a]
march
CS: [CAUSE ([MARCH (x)] , [BECOME (y, [$_{\text{PLACE-c}}$])])]
inherited CS

Having settled on (11) as the CS for *the general marched the soldiers into the town* and the other causatives in (4), what do we say about the derivation in (5) that we examined and rejected? The two derivations are abbreviated in (14) and (15). The arguments of the verb at each step of the derivations are in bold. (14) and (15) are labelled "Agent CS" and "Means CS" respectively, terms that will be explained below.

(14)

'Agent' CS	(2)	[**the soldiers**] marched
↓ Causative Formation		
	(10)	[**the general**] marched **[the soldiers]** mercilessly
↓ + PP		
	(11/4)	[**the general**] marched **[the soldiers]** [**into the town**]

(15)

'Means' CS	(2)	[**the soldiers**] marched
↓ + PP		
	(3)	[**the soldiers**] marched **[into the town]**
↓ Causative Formation		
	(5)	[**the general**] marched [the soldiers] [**into the town**]

If (14) is the correct derivation for the sentences in (4), what blocks (15) from producing (5), whose postverbal NP is not an argument of the verb the analysis of (4) that we rejected?

In fact, there is evidence that **both** derivations yield grammatical outputs, but they have two different meanings, and only (14), yielding (11), represents the meaning we have in mind. Consider the difference between (5) and (11). Using the terminology introduced in Chapter 6, Section 4, (5) is a "Means" CS, in which the CS of the base verb is inherited in a means VIA clause. It can be paraphrased as "the general caused [the soldiers to get into the town by (the soldiers') marching]". (11) is an "Agent" CS, in which the CS of the base verb is the agent, the first argument of CAUSE. It can be paraphrased as "[the general's marching the soldiers] caused the soldiers to get into the town". Though the difference is subtle, it can be elicited by contrastively stressing or questioning different elements. Stress on the verb brings out the means reading as does turning the sentence into the question: *how did the general get the soldiers into the town?* The response, *He **marched** them into the town*, has the means CS. The agent reading can be brought out by contrastively stressing or questioning the PP: *Into which town did the general march the soldiers?* The response, *He marched them **into Boston***, has the agent CS.

Now, if [*march NP PP*] has two meanings and the postverbal NP is an argument only under the agent meaning, then it should pass our diagnostics only under that reading. And this is exactly what we find. Nominals are ungrammatical with the means reading, in (16a), but fine with the agent reading, in (16b). (Contrastive stress is shown in bold.)

(16) a. ?*The **marching** of soldiers into downtown areas is possible but the **dancing** of soldiers into downtown areas is not.
b. The marching of soldiers into **downtown Boston** is realistic but the marching of soldiers into **most other downtown areas** is not.

Sentences like (4), then, actually have two CSs, one in which the postverbal NP is an argument of the verb, and one in which it is not. So our linking theory handles this first class of complex causatives, but more than that, it explains how the subtle ambiguity in sentences like *the general marched the soldiers into the town* in (4) can arise from two different derivations yielding two different CSs.

Before concluding, we should point out that the causatives in (4) are those derived from intransitive verbs with only volitional readings ("internally-caused" in Levin & Rappaport Horav's 1995 sense), which we treated as unergatives with an external argument. What about the subclass of causatives derived from nonvolitional verbs like (17), shown in (18)?

(17) a. The boulders rolled (down the hill).
b. The mug slid (across the counter).

(18) a. The geologists rolled the boulders down the hill.
b. The waitress slid the mug across the counter.

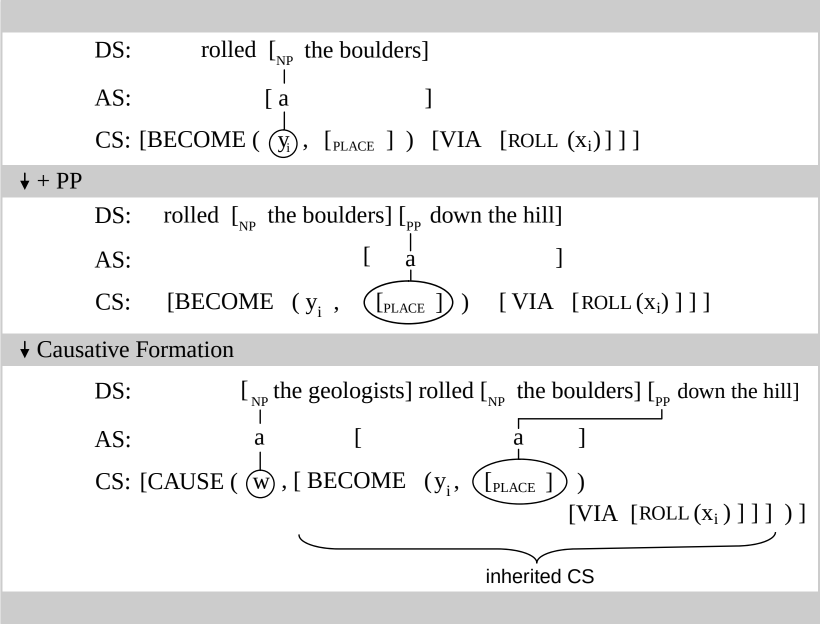
The postverbal NPs for this subclass pass the argumenthood tests. (Only the causative readings are relevant to this discussion: someone rolls the shoulders; someone slides the mugs.)

(19) Middle Formation (causative readings only)
Granite boulders don't roll down hills as easily as basalt ones.
Plastic mugs don't slide across counters as easily as porcelain ones.

(20) Nominal Formation (causative readings only)
The rolling of boulders down hills (is strictly forbidden by the Parks Department.)
The sliding of mugs to customers (is strictly forbidden by the manager.)

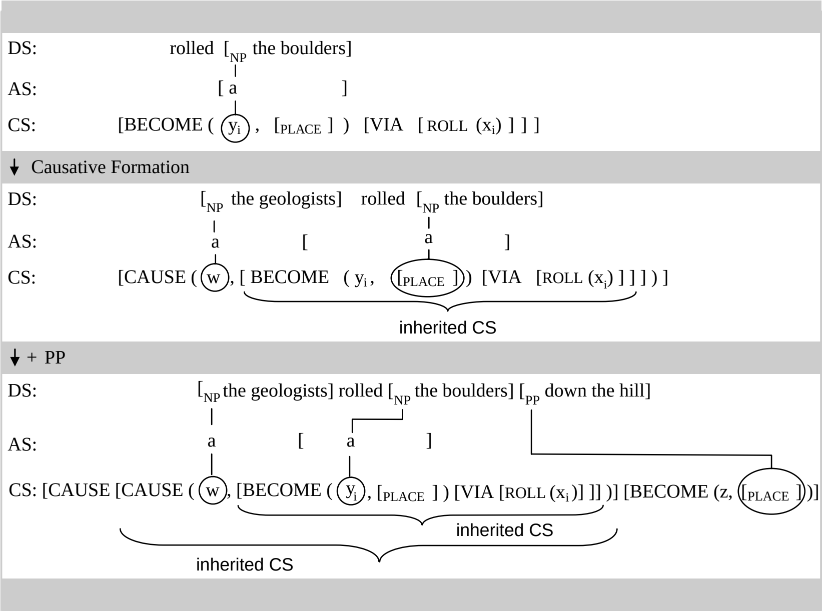
Like the *march* verbs in (14) and (15), this subclass of causatives also has two possible derivations. Both are based on unaccusative *roll*. In (21), which has a "Means" CS, the PP is added first. This causes a shift in argument structure: the PLACE now links and the theme, y, does not. Causative Formation then applies adding an external agent argument, w. The meaning corresponding to this Means CS derivation is: "the geologists caused [the boulders to go down the hill by (the boulders') rolling]."

(21)


DS: rolled [NP the boulders]
AS: [a]
CS: [BECOME (yi , [PLACE]) [VIA [ROLL (xi)]]]
+ PP
DS: rolled [NP the boulders] [PP down the hill]
AS: [a]
CS: [BECOME (yi , [PLACE]) [VIA [ROLL (xi)]]]
Causative Formation
DS: [NP the geologists] rolled [NP the boulders] [PP down the hill]
AS: a [a]
CS: [CAUSE (w , [BECOME (yi , [PLACE]) [VIA [ROLL (xi)]]])]
inherited CS

In (22), which has an “Agent” CS, Causative Formation applies first, to add an agent, w, then the PP is added. This PP is an argument because its corresponding PLACE is in a separate CS clause and linking is not ruled out by the PADF. The meaning corresponding to this Agent CS derivation is: “[the geologists’ rolling the boulders] caused [the boulders to go down the hill].”

(22)


DS: rolled [NP the boulders]
AS: [a]
CS: [BECOME (yi , [PLACE]) [VIA [ROLL (xi)]]]
Causative Formation
DS: [NP the geologists] rolled [NP the boulders]
AS: a [a]
CS: [CAUSE (w, [BECOME (yi , [PLACE]) [VIA [ROLL (xi)]]])]
inherited CS
+ PP
DS: [NP the geologists] rolled [NP the boulders] [PP down the hill]
AS: a [a]
CS: [CAUSE [CAUSE (w, [BECOME (yi , [PLACE]) [VIA [ROLL (xi)]]])] [BECOME (z, [PLACE])]
inherited CS
inherited CS

It is the derivation in (22), whose postverbal NP corresponds to an argument of the causative verb, that is the source of (18) and the grammatical results in the argumenthood tests in (19) and (20). Moreover, there is no double fusion violation, so these complex causatives are also explained by our theory.

9.2 Causative “Material Means” Verbs: *paste* and *staple*

Causative “material means” verbs, like those in (23), are derived from nouns. These verbs express the idea that the postverbal NP comes to be in the location designated by the following XP by means of the noun underlying the verb. We call these verbs “material” means verbs because the noun denotes some kind of material.[4]

(23) a. She pasted the moustache to the mask.
b. She stapled the receipts to the reimbursement requests.
c. She taped the compass to the dashboard.
d. She glued the photo onto the application.

One possibility for a CS for these verbs is to consider them primarily change-of-location verbs like *put*, with the base noun’s meaning embedded in a subordinate means constituent. Under this analysis, (23a) would mean something like “She got the moustache to the mask via paste”.

(24) [CAUSE (w , [BECOME (y, $[_{\text{PLACE-c}}$])])
[VIA < PASTE >]

The problem is that, unlike *put*, these verbs all pass the Argument Structure diagnostics, showing that their postverbal NPs are arguments. The middles in (25), the nominalizations in (26), and the adjectival passives in (27) in are all grammatical.

(25) a. Raffia moustaches paste to paper-maché masks easily.
b. Receipts staple to reimbursement requests easily.
c. Some gadgets do not tape to dashboards readily.
d. Passport photos glue onto applications readily.

(26) a. The pasting of moustaches to masks is common among puppeteers.
b. The stapling of receipts to reimbursement requests is required.
c. The taping of gadgets to dashboards is risky.
d. The gluing of photos onto applications is frowned upon.

(27) a. The moustaches remained pasted to the masks, after all these years.
b. The receipts remained stapled to the reimbursement requests.
c. The gadget remained taped to the dashboard.
d. The photos remained glued onto those applications.

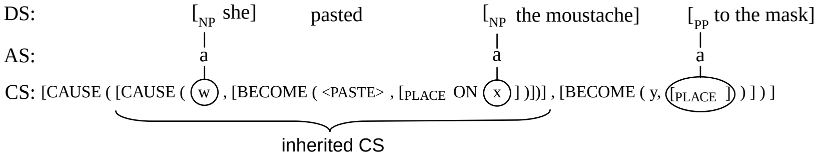
If the highest, most central portion of their CSs were like *put*’s, this should not be the case.

---

[4] Some of these fall into the “tape” verb class in Levin (1985: 162), a subset of her “verbs of combining and attaching”.

Our intuition is that these verbs have a subtly different meaning from *put*-class verbs. (23a) means something like [[w applies paste to x] causes [y to come to be [at a location]], as shown in (28).[5]

(28)


DS:
[NP she]
pasted
[NP the moustache]
[PP to the mask]
AS:
a
a
a
CS: [CAUSE ([CAUSE (w , [BECOME (<PASTE> , [PLACE ON x])])] , [BECOME (y, [PLACE])])]
inherited CS

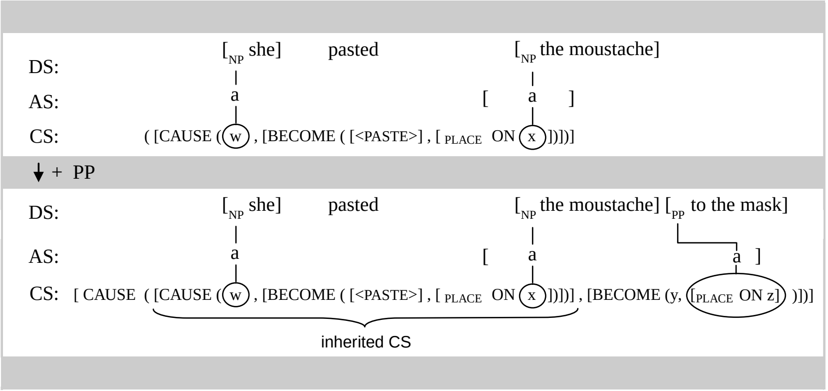
Notice that the CS in (28) (like the CS of causative *march* with a PP, above) is parallel to that of transitive resultatives; it is a causative with a CS clause as its agent. Now, if this is the CS for the verb *paste*, then the argumenthood of *the moustache* is not problematic. By virtue of satisfying the first internal argument position, its CS fuses with x. It fuses with y – only once – by virtue of being the subject of [*to the mask*]. No CS constituent is fused with twice, so there is no violation of the Prohibition Against Double Fusion.

Support for this analysis comes from the fact that these verbs can be used without a PLACE PP.

(29) a. “Don’t paste that; it won’t stick,”.
b. I’ve collated my handouts, but I haven’t stapled them yet.
c. She taped her wallet so it would last the rest of the trip.
d. Instead of buying a new vase, why don’t you just glue this one?

The grammaticality of the sentences in (29) means that the simple causative verbs without PPs are derived from the nouns and, in turn, are the inputs to derive the variants with the PPs in (23). As with resultatives, the rule that derives the transitive verb with the PP inherits the CS of the simple transitive verb without the PP into its agent position, as shown in (30).

(30)


DS:
[NP she]
pasted
[NP the moustache]
AS:
a
[a]
CS:
([CAUSE (w , [BECOME ([<PASTE>] , [PLACE ON x])])]
+ PP
DS:
[NP she]
pasted
[NP the moustache] [PP to the mask]
AS:
a
[a
a]
CS:
[CAUSE ([CAUSE (w , [BECOME ([<PASTE>] , [PLACE ON x])])] , [BECOME (y, [PLACE ON z])])]
inherited CS

---

[5] ‘Applies to’ is deliberately vague. In the case of gluing a photo to a piece of paper, it is enough to coat the surface of one or the other of them with glue. But for stapling, staples must go through and somehow grip the surfaces of the stapled elements. We will assume that the word formation rule specifies just that the instrument comes to be at some entity. The finer shades of meaning come from the lexical entry of the instrument. She X-ed the paper to the tree fixes its meaning from our lexical knowledge of X.

To sum up, the PP variants of these verbs do express a change-of-location, just as *put* does. However, unlike *put*, the first argument of CAUSE is the CS inherited from the base verb, a linking pattern parallel to that of transitive resultatives. With this structure, these verbs comply with the Isomorphic Linking Hypothesis, obey the Prohibition Against Double Fusion, and are thus compatible with our theory.

9.3 Causative Instrument Verbs: *hammer* and *spoon*

Another class of verbs derived from nouns are the instrumental verbs shown in (31) (c–d come from Clark & Clark, 1979).

(31) a. The roofer hammered the shingles to the tarpaper.
b. The chef spooned the melon balls into the bowls.
c. The tow-truck winched the bus up the slope.
d. The farmer pitchforked the hay into the wagon.

Unlike the *paste* class above, though, these are ungrammatical without their PP.

(32) a. *The roofer hammered the shingles.
b. *The chef spooned the melon balls.
c. *The tow-truck winched the bus.
d. *The farmer pitchforked the hay.

To be sure that it is not pragmatics that is ruling out the cases in (32), we should put them into contexts parallel to the ones we used for the *paste*-class verbs. They are still ungrammatical:

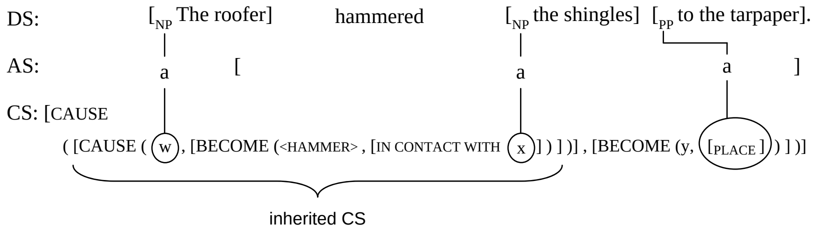
(33) a. *After you're finished laying out the shingles on the tarpaper, you can start hammering them.
b. *I've made melon balls with this little implement, but I haven't spooned them yet.
c. *To get that bus out of the mud, the tow-truck had to winch it.
d. *To get the hay onto that wagon, the farmer pitchforked it.

This pattern would seem to suggest that these verbs have a CS similar to *put*, which is also ungrammatical without a PP. If this were the case, then like *put*, they would be primarily change-of-location verbs but would have an additional subordinate CS constituent containing the base noun. Under this analysis, (33a) would mean something like "The roofer got the shingles onto the roof via a hammer". If the PLACE linked as it does for *put*, the postverbal NP would not be an argument of the verb, since the ILH rules out the two CS sisters, y and PLACE, from both linking.

(34) [CAUSE (w , [BECOME (y , $[_{\text{PLACE-c}}$])])
[VIA <HAMMER>]]

However, we believe that the *put*-analysis in (34) is incorrect for [*hammer* NP PP]. Rather, like the *paste* class that we just discussed, these verbs have a more complex CS, parallel to transitive resultatives. (31a) means something like [[w uses a hammer on x] causes [y to come to be [at a location]], as shown in (35).

(35)


DS: [NP The roofer] hammered [NP the shingles] [PP to the tarpaper].
AS: a [a a]
CS: [CAUSE
([CAUSE (w , [BECOME (<HAMMER> , [IN CONTACT WITH x])])] , [BECOME (y, [PLACE])])]
inherited CS

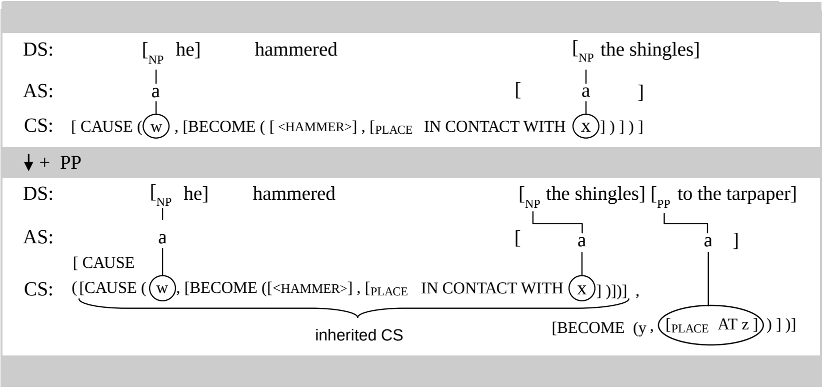
In this more complex structure, the postverbal NP *is* an argument, and is predicted to pass the argumenthood tests. It passes both Middle Formation in (36) and Nominal Formation in (37), unlike the postverbal NP of *put*.[6]

(36) MF
a. Shingles hammer to tarpaper easily.
b. Melon balls spoon into bowls easily.
c. This size bus doesn’t winch up a slope easily.
d. This kind of hay pitchforks into wagons easily.

(37) NF
a. The hammering of shingles to tarpaper takes practice.
b. The spooning of melon balls into bowls can take a long time.
c. The winching of buses up slopes is easy with this winch.
d. The pitchforking of hay into wagons is something you don’t see much anymore.

And under this analysis, linking accords with the ILH, since the CS elements linked to the two AS sisters, x and PLACE, come from two separate CS clauses. Now, how is the CS in (35) derived? One possibility is the derivation in (38).

(38)


DS: [NP he] hammered [NP the shingles]
AS: a [a]
CS: [CAUSE (w , [BECOME ([<HAMMER>] , [PLACE IN CONTACT WITH x])])]
+ PP
DS: [NP he] hammered [NP the shingles] [PP to the tarpaper]
AS: a [a a]
[CAUSE
CS: ([CAUSE (w , [BECOME ([<HAMMER>] , [PLACE IN CONTACT WITH x])])] ,
inherited CS
[BECOME (y , [PLACE AT z])])]

This derivation is similar to the derivation of *paste* in (30). There is one potential problem, however. The *paste*-class verbs have transitive forms, those in (29), but the

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[6] Adjectival Passive Formation is not a good test for these cases not because the postverbal NP is not an argument of the verb, but because the participles do not qualify as adjectives or “states”.

(i) APF
a. ?The shingles remained hammered to the tarpaper.
b. ?The melon balls remained spooned into the bowls.
c. ?The truck remained winched up the slope.
d. ?The hay remained pitchforked into the wagons.

hammer-class verbs do not, as (32) and (33) showed. If their derivations are parallel and if the postverbal NPs are arguments of the verbs for both, then why are the simple *hammer*-class transitive verbs in (32) and (33) ungrammatical?

One answer is that the lack of the “intermediate” verb [*hammer* NP] is a lexical gap. In other words, the relation between the noun *hammer* and the verb [*hammer* NP PP] is mediated by a hypothetical but non-occurring lexical item, [*hammer* NP]. We have seen such cases before.

Recall from Chapter 1 that our lexical rules have a double function. They can be used to coin new words, as productive word-formation rules. So *e-mailable* can be generated from the verb *to e-mail*. Or they can be used as redundancy rules expressing the relationship between already-existing words, e.g., *rebel* and *rebellion*. Knowing a verb like *rebel* plus the *-ion* rule, there is no cost involved in learning and storing *rebellion*. In contrast, there is a cost involved in learning a totally unrelated word, e.g., *scallion*.

Redundancy rules can also relate words via a non-existing word. For example, *aggression* is indirectly related to *aggressor* and *aggressive* by the *-or* and *-ive* lexical rules and the non-occurring base verb that they share, *aggress*.

(39) [$_{\text{V}}$] + [*ion*]$_{\text{N}}$ ⟶ [[$_{\text{V}}$ *aggress*] + *ion*]$_{\text{N}}$
+ [*ive*]$_{\text{A}}$ ⟶ [[$_{\text{V}}$ *aggress*] + *ive*]$_{\text{A}}$
+ [*or*]$_{\text{N}}$ ⟶ [[$_{\text{V}}$ *aggress*] + *or*]$_{\text{N}}$

Aggress has mental reality. We know what category it is and what it means. The fact that it is a non-occurring verb is not relevant. In fact, the process of back-formation applies in cases exactly like this one to fill the lexical holes that such forms would occupy.

Similarly, with *hammer*, our claim is that there is an intermediate verb *hammer* that means something like “to use a hammer on X”. Notice that this hypothetical verb is the input not only to the change-of-location verb [*hammer* NP PP] in (31), which has a concrete PLACE, but also to the resultative verb [*hammer* NP XP], where the XP corresponds to an abstract PLACE – a state – as in (40).

(40) The mechanic hammered the hubcap flat.

(41)
[$_{\text{N}}$ hammer]
↓ N to V
[$_{\text{V}}$ hammer] [$_{\text{NP}}$]
↓ + XP
[$_{\text{V}}$ hammer] [$_{\text{NP}}$ shingles] [$_{\text{PP}}$ to tarpaper] concrete PLACE
[$_{\text{V}}$ hammer] [$_{\text{NP}}$ hubcaps] [$_{\text{AP}}$ flat] abstract PLACE (resultative)

According to our analysis of resultatives in Chapters 5 and 6, resultative *hammer* presents a puzzle since *hammer the hubcap flat* is a transitive resultative whose postverbal NP is an argument of the verb, as shown by the diagnostics, in (42).

(42) MF: Toyota hubcaps hammer flat easily.
APF: the hammered-flat hubcaps
NF: the hammering of hubcaps flat

Yet the base verb underlying this transitive resultative is not a grammatical transitive verb itself:

(43) *The mechanic hammered the hubcaps.

So the resultative in (40) is an example of the same phenomenon as the cases in (31). Both lack an "intermediate" transitive verb.

In fact, we have already seen other verbs that have a complex resultative CS but no corresponding basic verb, for instance *smite*, *lull*, *wrest* and *knock* (discussed in Chapter 5, Section 2.1.2).

(44) a. God smote him *(*dead*).
b. The muzak lulled the patients *(*asleep*).
c. The knight wrested the sword *(*from the stone*).
d. The boxer knocked his opponent *(*senseless*).

The nonexistence of [*hammer* NP], then, is paralleled by the nonexistence of **The muzak lulled the patients* or **God smote him*.

Finally, there are cases parallel to (31), where the intermediate simpler verb exists, probably derived as a back-formation from the more complex one. All of the verbs in (45) are instrumental verbs that do not require PPs:

(45) She shoveled the snow (from the walk).
She raked the leaves (from the lawn).
She plowed the snow (out of the driveway).
She batted the ball (into left-field).

In sum, *hammer*-class verbs, which appeared problematic, are not. Since they have the CS in (35), not (34), their linking theme and PLACE are not sisters in the same CS Domain. Like the *paste* class, their CS is derived from the CS of a transitive base verb which is then embedded in a larger CS. Its linking is just like a transitive resultative, and it obeys the Prohibition Against Double Fusion in the same way.

9.4 Causative Alternating Verbs: A Reanalysis of the *load* and *spray* Classes

We now return to consider the linking of "*spray-load*" verbs with respect to the Prohibition Against Double Fusion. Recall that these verbs alternate between a locative PP variant and a "*with*"-variant.

(46) locative variant: *load*
  a. The farmers loaded hay into the wagons.
  b. The factory workers stuffed feathers into the pillows.
  c. The lifeguard piled the lifejackets onto the dock.
  d. The hungry students heaped lasagna onto their plates.

(47) *with* variant: *load*
  a. The farmers loaded the wagons with hay.
  b. The factory workers stuffed the pillows with feathers.
  c. The lifeguard piled the dock with lifejackets.
  d. The hungry students heaped their plates with lasagna.

(48) locative variant: *spray*
  a. The spectators sprayed water on the runners.
  b. He splattered toothpaste on the mirror.
  c. She splashed water on her face.

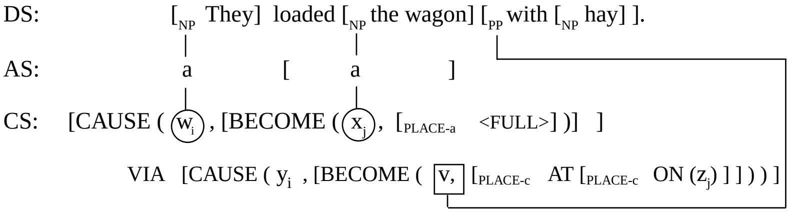
(49) *with* variant: *spray*
  a. The spectators sprayed the runners with water.
  b. He splattered the mirror with toothpaste.
  c. She splashed her face with water.

In Chapter 4, Section 2 and Chapter 6, Section 2, we briefly analyzed the two variants of these verbs, proposing them as stemming from two distinct CSs with distinct ASs (following Levin and Rappaport, 1988 and after). We revisit them now to refine our analyses and show that they make the correct predictions about their argument structures. We begin with the *with* variants.

9.4.1 The With *Variants*

The CSs of the *with* variants express a change of state. At the highest level, the CS of *load NP with NP*, in (50), can be expressed as “w_i (they) caused x_j (the wagon) to become full via y_i (they) causing v (hay) to come to be on z_j (the wagon).” This explains why the *with* form gets a ‘holistic’ interpretation, that is, why the wagon is understood to be completely full.

(50)

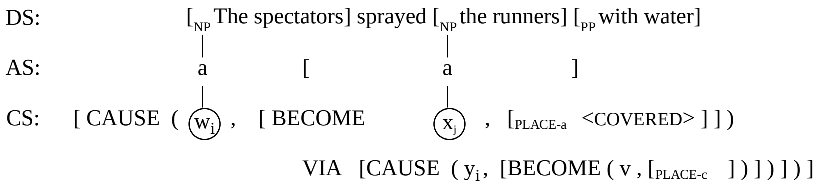

DS: [$_{NP}$ They] loaded [$_{NP}$ the wagon] [$_{PP}$ with [$_{NP}$ hay]].
AS: a [a]
CS: [CAUSE (w_i , [BECOME (x_j , [$_{PLACE\text{-}a}$ <FULL>])]]
VIA [CAUSE (y_i , [BECOME ($\boxed{v,}$ [$_{PLACE\text{-}c}$ AT [$_{PLACE\text{-}c}$ ON (z_j)]]))]

In accordance with the ILH, w is higher than x, so w links externally and x links internally. Thus the postverbal NP is an argument of the verb. The abstract PLACE,

<FULL> a constant, does not link. The VIA clause expresses Levin & Rappaport's (1988) paraphrase, 'by causing the hay to come to be in it.' v does not link and is therefore not an argument; the CS of *hay* fuses with it directly, through *with*-adjunct fusion. y_i and z_j are prevented from linking by the Bound Argument Condition.[7]

The *with* variants of *spray*, *splatter*, and *splash*, in (49), are like *load*'s in (47), change-of-state verbs with the manner-of-motion embedded under VIA. But instead of <FULL>, the endstate is <COVERED>.

(51)


DS: [NP The spectators] sprayed [NP the runners] [PP with water]
AS: a [a]
CS: [CAUSE (wi , [BECOME xj , [PLACE-a <COVERED>]])
VIA [CAUSE (yi , [BECOME (v , [PLACE-c])])])]

This analysis predicts that for both classes, the postverbal NPs should pass our argument diagnostics, Nominal Formation, Adjectival Passive Formation and Middle Formation. And they do:

(52) NF a. The loading of wagons with hay is a prickly job.
The stuffing of pillows with feathers can be frustrating.
The piling of docks with lifejackets is necessary whenever we do an inventory.
The heaping of plates with lasagna is common in school cafeterias.

b. The spraying of runners with water is commonplace during certain races.
The splattering of mirrors with toothpaste is frowned upon when you're a guest.
The splashing of canvases with paint is acceptable when you're Jackson Pollack.

(53) APF a. The wagons remained loaded with hay.
The pillows remained stuffed with feathers.
The dock remained piled with lifejackets.
The plates remained heaped with lasagna.

---

[7] The CSs of *stuff* and *heap* are similar in the highest clause but differ slightly in the lower clause. *Stuff*'s VIA clause contains something like "the farmers cause the hay to become compressed" and *heap*'s, something like "the farmers cause the hay to become piled up". In fact, this second line might be handled instead by pragmatics and not the lexicon, as mentioned for *glue* and *staple*, above.

b. The runners remained sprayed with perfume.
The mirror remained splattered with toothpaste.
The canvas remained splashed with paint.

(54) MF a. These wagons load easily with pallets.
These pillows stuff readily with goosefeathers.
This dock piles high with lifejackets when the canoes return at the end of the day.
These bowls heap more easily with lasagna than those plates do.

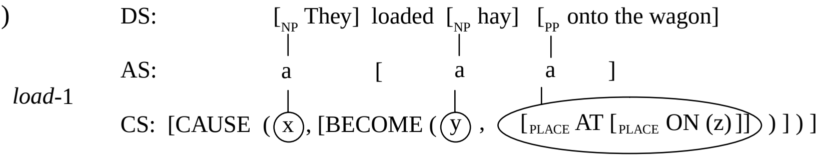
b. Quickly moving runners don't spray easily with water.
Bathroom mirrors splatter regularly with toothpaste.
Jackson Pollack knows which kind of canvas splashes most accurately with paint.

So our analysis of the *with* variants in (50) and (51), with a linking theme argument and a non-linking PLACE adjunct, follows the ILH, is supported by our argumenthood tests and obeys the PADF.

9.4.2 The Locative Variants

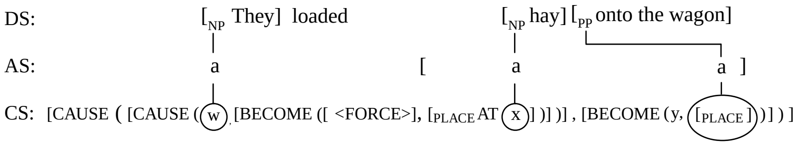
Now let us turn to the locative variants of these verbs, in (46) and (48). We analyzed these (in line with Levin and Rappaport 1988 and elsewhere) as change-of-location verbs. Our CS for *load* from Chapter 6 (23) is in (55); the highest CS clause is identical to that of *put*. That is, *they loaded hay onto the wagon* essentially means "they caused hay to come to be on the wagon."

(55)

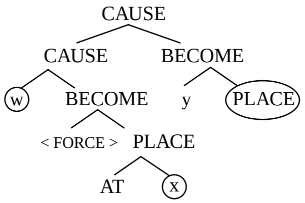

DS:
[NP They] loaded [NP hay] [PP onto the wagon]
AS:
a [a a]
load-1
CS: [CAUSE (x), [BECOME (y) , [PLACE AT [PLACE ON (z)]])])]

But *load* means more than *put*. Loading involves exerting some force on the theme (here, the hay). This is clear from comparing *They loaded the plano onto the truck* with *?They loaded the feather onto the truck*. The second one is good only if the feather presented a struggle to get onto the truck, by being very large or very heavy. One way to capture this idea is to treat these verbs as parallel to the *hammer*-class verbs above, but instead of a hammer coming in contact with the theme, it is FORCE, as shown in (56a) and in tree form in (56b):

(56) a.

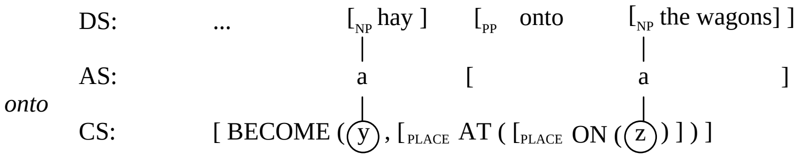

DS:
[NP They] loaded
[NP hay] [PP onto the wagon]
AS:
a
[a a]
CS: [CAUSE ([CAUSE (w, [BECOME ([<FORCE>], [PLACE AT x])])] , [BECOME (y, [PLACE])])]

b.



With this representation, change-of-location *load* is a 3-argument verb. w is higher than x in their CS Domain, so they link as external and internal arguments of the verb, respectively. PLACE links to the remaining internal argument. y does not link. As for many of the verbs we have seen, including resultatives in Chapter 5 and change-of-location verbs like *put* in Chapter 7, Section 1 and *the general marched the soldiers into the town* in Section 1 of this chapter, y is the external argument of the preposition *onto*, the head of the XP linked to the PLACE argument of the verb, but is not an argument of the verb itself:

(57)



This linking pattern in (56) follows the ILH and causes no PADF violation. It also makes the right prediction about the postverbal NPs for these verbs, which are arguments of the verb according to our argument tests, Middle Formation, Adjectival Passive Formation, and Nominal Formation. They contrast with the postverbal NP of *put*, which is *not* an argument, as shown in (58)-(60):

(58) MF a. *Cans of certain shapes put into crates more easily than others.

b. Round hay bales load onto trucks more easily than square ones.
Goose feathers stuff into pillows more easily than duck feathers.
These life-jackets pile onto the dock more easily than those.
The lasagna heaps onto the large plates easily.

(59) APF a. *the put-outside cans
*the cans remained put onto shelves

b. The hay remained loaded on the trucks.
The feathers remained stuffed in the pillows.
The life-jackets remained piled on the dock.
The lasagna remained heaped on the plates.

(60) NF a. ?the putting of cans onto shelves

b. the loading of hay onto trucks
the stuffing of feathers into pillows
the piling of life-jackets onto docks
the heaping of lasagna onto plates

The locative versions of the *load* class, then, have three obligatory arguments, one external and two internal. And like the *hammer* and *smite/lull* verbs discussed in the last section, they differ from transitive resultatives in that there is no transitive verb that corresponds to the agent portion of the CS in (56), as shown by the ungrammatical transitive cases in (61). [8]

(61) a. *The farmers loaded hay.
b. *The factory workers stuffed feathers.
c. *The lifeguard piled the lifejackets.
d. *The hungry students heaped lasagna.

Now consider the locative variant of the *spray* verbs in (48) repeated in (62b). They differ from the *load* class in (62c) in that, like *march* in (62a), they have a set of non-causative (unaccusative) counterparts, shown in (63):

(62) causative
a. The general marched the soldiers into the town.
The ballet-master danced the ballerina onto the stage.
She ran her dog around the track.
The swimming instructor swam the kids to the deep end of the pool.

b. They sprayed water onto the runners.
He splattered toothpaste on the mirror.
She splashed water on her face.

c. They loaded hay onto the wagon.
They stuffed the feathers into the pillow.
They piled the life-jackets on the dock.
They heaped the lasagna on the plates.

---

[8] Under this analysis, change-of-location *load* need not have a (non-occurring) “intermediate” transitive form as in the derivation we proposed for *hammer* in (38) above. In fact, it may be possible to analyze *hammer* parallel to *load* as in (56), but at this point, we leave the choice of one analysis over the other as a question for further research.

(63) non-causative

a. The soldiers marched into the town.
The ballerinas danced onto the stage.
The dogs ran around the track.
The kids swam to the deep end.

b. The water sprayed onto the runners.
Toothpaste splattered on the mirror.
The water splashed onto her face.

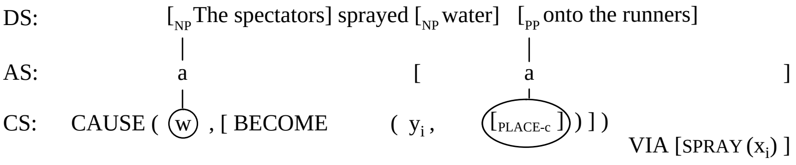
c. *The hay loaded onto the wagon.
*The feathers stuffed into the pillow.
*The life-jackets piled on the dock.
*The lasagna heaped on the plates.

Taking the parallel to *march* seriously, there are two possible derivations for causative *spray*, parallel to (14) and (15), above. The first is sketched in (64). The non-causative, manner-of-motion *spray* adds a locative PP then undergoes Causative Formation (CF). The result is (65). (As above, the arguments at each step of the derivation are in bold.)

(64) Derivation 1 for locative causative *spray*

the water sprayed (forcefully)	cf. the soldiers marched
↓ + PP	
the water sprayed **onto the runners**	cf. the soldiers marched into the town
↓ Causative Formation	
they sprayed water **onto the runners**	cf. the general marched the soldiers into the town

(65) causative *spray* (from derivation 1)


DS:
[NP The spectators] sprayed [NP water] [PP onto the runners]
AS:
a
[
a
]
CS:
CAUSE (w , [BECOME (yi , [PLACE-c])])
VIA [SPRAY (xi)]

This CS does not give us the right result, though. The PLACE links and y does not, so the postverbal NPs should not pass the argument diagnostics. But they do:

(66) MF This new latex sprays onto primed boards easily.
This toothpaste splatters onto mirrors more easily than other brands.
Paint splashes onto canvases accurately when you're Jackson Pollack.

(67) APF The latex remained sprayed on the boards.
The toothpaste remained splattered on the mirror.
The paint remained splashed onto the canvases.

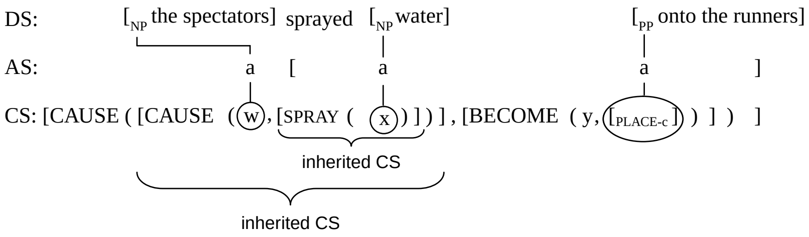
(68) NF the spraying of latex onto pre-primed boards
the splattering of toothpaste onto mirrors
the splashing of paint onto canvases

Derivation 2, in (69), however, gives us the right result. Here, causative locative *spray* is derived from a manner-of-motion verb. Non-causative manner-of-motion *spray* undergoes Causative Formation, then a locative PP is added, resulting in (70).

(69) Derivation 2 for locative causative *spray*

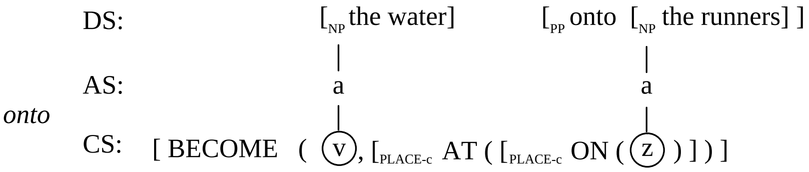
the water sprayed (forcefully)	cf. the soldiers marched
↓ Causative Formation	
they sprayed water	cf. the general marched the soldiers
↓ + PP	
they sprayed water **onto the runners**	cf. the general marched the soldiers into the town

(70) causative *spray* (from derivation 2)


DS:
[NP the spectators] sprayed [NP water] [PP onto the runners]
AS:
a [a a]
CS: [CAUSE ([CAUSE (w), [SPRAY (x)])] , [BECOME (y, [PLACE-c])])]
inherited CS
inherited CS

Here, w and x are in the same CS Domain and link to external and internal argument positions, respectively, in line with the ILH. The PLACE, in a separate CS Domain, links internally, and y is prohibited from linking. Thus the postverbal NP corresponds to x, not to y. The interpretation of y as corresponding with *water* comes from the CS of *onto*, in (71).

(71)


DS:
[NP the water] [PP onto [NP the runners]]
AS:
a a
onto
CS: [BECOME (v, [PLACE-c AT ([PLACE-c ON (z)])]

After argument fusion, the CS looks like (72):

(72) CS: [BECOME (WATER, [$_{\text{PLACE-c}}$ AT ([$_{\text{PLACE-c}}$ ON (RUNNERS)])]

When the CS in (72) fuses with the CS of the verb in (70), [WATER] fuses with y, so there is no double fusion in the verb's CS. And this explains why causative locative *spray* passes the argument structure tests in (66)–(68), since the postverbal NP is an argument of the verb.

One question for this analysis is the status of "intermediate" *spray* without a PP (*they sprayed the water; the water sprayed*). We have seen the situation in which an "intermediate" verb in a derivation (*hammer* NP in the last section) is not an actually-occurring independent verb. For the *spray* class, it appears to be, as shown in (73), where the locative XP is optional.

(73) a. This water won't spray. It just comes out as a trickle.
Spaghetti sauce can splatter when you open the can.
Paint splashes if it's too thin.

b. They sprayed the water forcefully.
They splattered the toothpaste.
They tried to splash the paint but it was too thick.

And, here, too, as expected, the outputs of Middle Formation, Adjectival Passive Formation, and Nominal Formation are grammatical; the postverbal NPs are arguments of these verbs.

(74) MF Latex paint sprays readily.
This toothpaste splatters easily.
Water in shallow basins splashes easily.

(75) APF the unsprayed paint
the unsplattered toothpaste
the unsplashed water

(76) NF The spraying of paint is not allowed in kindergartens.
The splattering of toothpaste is common with electric toothbrushes.
The splashing of water is not permitted during recess.

To conclude, the two variants of the *load* and *spray* verb classes are explained by our linking theory. The *with* variant, with our revised CS, has two linking arguments and an optional adjunct. The locative variant of *load* has three obligatory linking arguments. The locative variant of *spray* can link either three arguments or two. Either way, because of its complex CS, the postverbal NP is an argument of the verb, in accordance with the ILH and the PADF.

Chapter 10
Other Verb Classes, Other Issues, and Conclusions

Our conclusions in Chapters 5 and 6 about Clausal Fusion and the Prohibition Against Double Fusion led us to reanalyze the Conceptual Structures, Argument Structures, and linking patterns of a number of verb classes. But not all of the verb classes that we have discussed require a reanalysis; as we will show in Sections 1 and 2, below, many of our original linking analyses can stand. In Section 3, we tie up a loose end from Chapter 1, our proposal to streamline CS by reducing the number of CS primitives: a) subsuming GO under a form of BE, namely BECOME (our term for Jackendoff's INCHoative BE), and b) replacing PATH with PLACE. After reviewing our original arguments, we present additional evidence for these modifications. In Section 4, our final section, we step back to review the progress we have made.

10.1 Adjunct Fusion Versus Argument Linking: *bag* and *butter*

In Chapter 7, we reanalyzed the *deliver* and *convert* classes, in (1), which have an optional PP expressing PLACE. When this PP is present, it is an **argument** of the verb. When it is absent, it is still understood implicitly, so we called these variants "implicit PLACE" verbs.

(1) a. They deliver newspapers (to rural customers).
b. She converted her basement (into a darkroom).

Related to these verbs are "incorporated PLACE" and "incorporated theme" verbs like *bag* and *butter* in (2), which we analyzed in Chapter 4, Section 2.

(2) a. We bagged the groceries (in biodegradable bags).
This machine boxes cigars (in cardboard cartons).
They bottle their home-made beer (in plastic bottles).
I filed the letter (in the income-tax file).
Marion shelves dictionaries (on the top shelf).

b. The queen buttered her crumpet (with margarine).
The queen powdered her nose (with cornstarch).
The queen salted her tomato (with a salt substitute).

J. Randall, *Linking: The Geometry of Argument Structure*, 281–296

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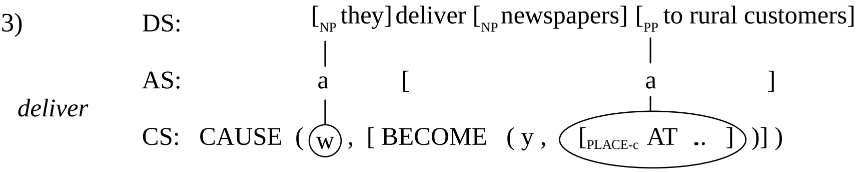
The baker dusted the crullers (with confectioner's sugar).
The cabinetmaker lacquered the box (with a water-based product).
They plastered the ceiling (with a lime-based substance).
The runner bandaged her knee (with a gauze bandage).
They tiled their bathroom floor (with terra cotta).

For these, like those in (1), the PLACE or theme is part of the verb's meaning. But recall that here, when the additional PLACE or theme PP appears with the verb, it is an adjunct, not an argument. Let us review our analyses of these incorporated argument verbs in light of our revised linking theory, beginning with *bag*.

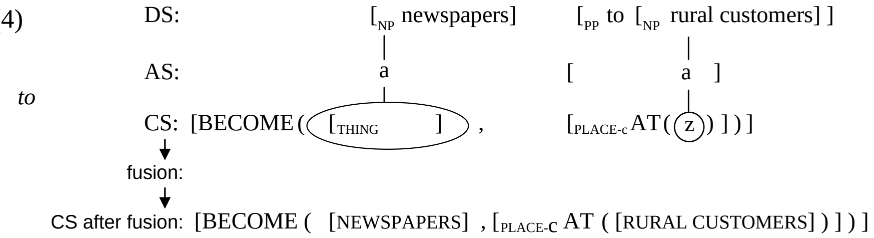
Bag, like *deliver*, has an optional PP expressing PLACE. Recall that for *deliver*, which we reanalyzed in Chapter 7, Section 2.1 as in (3), when the PLACE is present, the theme, y, is not an argument of the verb.

(3)


DS: [NP they] deliver [NP newspapers] [PP to rural customers]
AS: a [a]
deliver
CS: CAUSE (w , [BECOME (y , [PLACE-c AT ..])])

When the arguments of the preposition fuse with its CS, Clausal Fusion fuses the external and internal arguments of *to*, yielding the output in (4).

(4)


DS: [NP newspapers] [PP to [NP rural customers]]
AS: a [a]
to
CS: [BECOME ([THING] , [PLACE-c AT (z)])]
fusion:
CS after fusion: [BECOME ([NEWSPAPERS] , [PLACE-c AT ([RURAL CUSTOMERS])])]

This output then fuses with the verb's CS in (3), yielding (5):

(5) [CAUSE (w, [BECOME ([NEWSPAPERS] , [PLACE-c AT ([RURAL CUSTOMERS])])])]

Since the CS of y in the verb's CS is filled in when the CS of the PP fuses with the CS of the verb, if y in the verb's CS were linked as an argument, a double fusion violation would result. That it is not an argument of the verb is confirmed in (6) by the three argument tests, Adjectival Passive Formation, Nominal Formation, and Middle Formation, (repeated from Chapter 7, (58)-(60)):

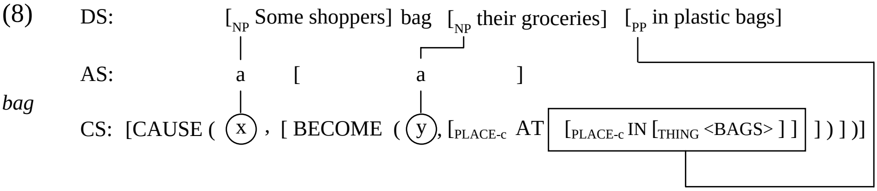
(6) APF *These newspapers remained undelivered to those customers.
NF *the delivering of newspapers to rural customers
MF *Neatly folded newspapers deliver to fussy customers easily.

For *bag*, in contrast, the postverbal NP is an argument of the verb.

(7) APF The groceries remained bagged in plastic bags.
NF The bagging of groceries in plastic bags is not recommended by environmentalists.
MF Some groceries bag more easily in plastic bags than in paper bags.

And the PP is an adjunct, not an argument, as shown in (8).

(8)


DS:
[NP Some shoppers] bag [NP their groceries] [PP in plastic bags]
AS:
a [a]
bag
CS: [CAUSE (x , [BECOME (y , [PLACE-c AT [PLACE-c IN [THING <BAGS>]]])])]

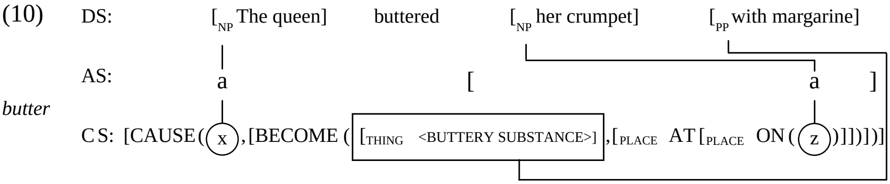
But in our original discussion of the *bag*-class of incorporated argument verbs in Chapter 4, we pointed out that there are selection restrictions on the incorporated CS constituent, here, the feature, <BAGS>, that the PP adjunct must be compatible with. And now, in light of the PADF, we must ask: how is it that when the CS of *bag*'s PP adjunct [*in plastic bags*] fuses with the PLACE in the CS of the verb, such features are not causing a double fusion violation? We will answer this question after we consider another class of verbs with similarly selected adjuncts, *butter*.

For the related *butter* class of "incorporated argument" verbs, in (2b), the theme is the incorporated argument.

(9) The queen buttered her crumpet *with margarine*.

And it similarly appears in the CS for *butter* in (10), as the feature <BUTTERY SUBSTANCE>.[1]

(10)


DS:
[NP The queen] buttered [NP her crumpet] [PP with margarine]
AS:
a [a]
butter
CS: [CAUSE(x),[BECOME ([THING <BUTTERY SUBSTANCE>] ,[PLACE AT [PLACE ON (z)]]])])]

The *with*-theme adjunct on this verb behaves similarly to the adjunct on the *bag*-class verbs. It can co-occur with a postverbal NP which is an argument of the verb, as the diagnostics indicate, and not cause a PADF violation:

(11) APF The crumpets appeared buttered with margarine.
NF The buttering of crumpets with margarine is common even in fancy teashops.
MF These crumpets don't readily butter with cold butter.

---

[1] The evidence that these *with*-phrases are adjuncts was given in Chapter 4, Section 2.

So, to return to the question: why do these *butter*- and *bag*-class adjuncts not cause a double fusion violation when their CSs fuse with the verb's CS?

Throughout our reanalyses in Chapters 7, 8 and 9, and in the analysis of *deliver* above, we have shown how Clausal Fusion (introduced in Chapter 5, Section 4) forces a PP argument of a verb to fuse with that verb's CS: what fuses is the CS of the preposition, containing the already fused CSs of its internal and external arguments. Double fusion violations occur when the external argument of the preposition is simultaneously an argument of the verb and fuses independently into the same position in the verb's CS. But adjuncts do not fuse in the same way. As discussed in Chapter 4, Section 2.1.1 (following Jackendoff, 1990), adjuncts fuse directly with the CS of the verb without involving AS, where arguments are registered. Two things govern Adjunct Fusion: (i) a particular adjunct rule, specifying what type of syntactic constituent can fuse with what CS configuration, and (ii) a feature marked on an incorporated constituent in the verb's CS, such as <BAGS> in (8) or <BUTTERY SUBSTANCE> in (10), which serves as a selectional restriction on the particular XP adjunct. For example, according to the *With*-theme Adjunct Rule, in (12), the adjunct [*with margarine*] fuses with the [$_{\text{THING}}$] position (first argument of BECOME) and because this position is unlinked in the verb's CS, no other CS element fuses with it to violate the PADF.

(12) ***With*-theme Adjunct Rule**: (adapted from Jackendoff, 1990:169)
Given the configuration [$_{\text{VP}}$ V ... [$_{\text{PP}}$ with NP]]
if the verb's CS contains [... [BE(COME) ([$_{\text{THING}}$] , [$_{\text{PLACE}}$])]]],
then the CS of the NP may fuse with THING.

Thus, compared with Argument Fusion, Adjunct Fusion is more minimal, involving only the exact subpart of the element in the verb's CS that the adjunct further specifies (for *butter*, the theme, for *bag*, the inner PLACE). It does not invoke Clausal Fusion, which would fuse an additional external argument. So an adjunct XP will always be able to appear with a postverbal NP that is an argument without the risk of double fusion.

While it might be surprising that one type of fusing constituent acts differently from another, it is something that our system can accommodate and it reinforces the argument/adjunct distinction. Adjuncts not only behave differently with respect to arguments in terms of order, *do so*, and the other standard syntactic tests, they also differ from arguments in how they affect the linking of the postverbal NP. In *deliver*'s CS, in (3), where an optional XP argument appears, which itself takes the postverbal NP as an external argument, the postverbal NP cannot also be an argument of the verb. But when the optional XP is an adjunct, as in (8) for *bag* and (10) for *butter*, it can.[2]

---

[2] It is also important to remember that not all argument XPs are in complementary distribution with all argument postverbal NPs. Resultatives, discussed in Chapter 6, and verbs with complex CSs have an extra CS position, so no PADF violation occurs. Both the NP and the XP are arguments of the verb.

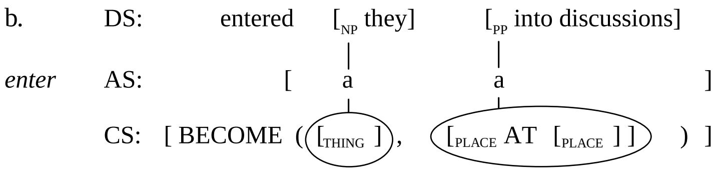
10.2 Non-Causative Transitive Verbs: *enter* and *inhabit*

One contrast that has been central to our linking theory is between *go* and *enter*. We reanalyzed *go* in Chapter 8, Section 1, showing that its PLACE links but its theme does not. In Chapter 3 we noted that in addition to transitive *enter* (as in *customers entered the store*), there is also an unaccusative version of *enter*, similar to *go*, except that its PP is optional. In this section, we will show that, as expected, unaccusative *enter* and other verbs in its class, like *descend*, should be reanalyzed just like *go* but transitive *enter* requires no reanalysis.

In Chapter 3, Section 4.3, we proposed that the unaccusative *enter* class in (13a), parallel to *go* with a PP, has two internal arguments as in (13b).

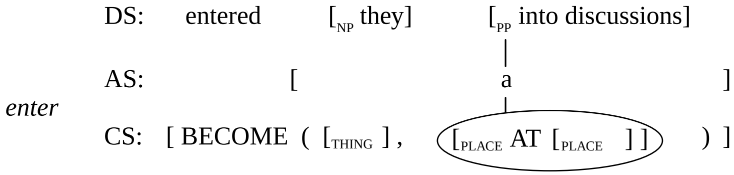
(13) a. They entered (into discussions).
The submarines descended (into the depths).

b.


DS: entered [$_{NP}$ they] [$_{PP}$ into discussions]
enter AS: [a a]
CS: [BECOME ([$_{THING}$], [$_{PLACE}$ AT [$_{PLACE}$]])]

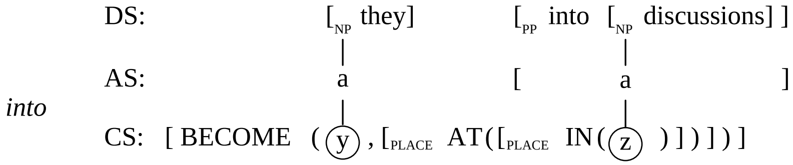
Now, however, to satisfy the PADF, we must reanalyze this version of *enter* along the same lines as *go*, with only one linking argument, the PLACE, as in (14).

(14)


DS: entered [$_{NP}$ they] [$_{PP}$ into discussions]
AS: [a]
enter
CS: [BECOME ([$_{THING}$], [$_{PLACE}$ AT [$_{PLACE}$]])]

As with *go* and all of the other unaccusatives we have seen, the theme, *they*, is not an argument of the verb. It is an argument of the preposition *into* and comes to be interpreted as the theme of the verb when the CS of the PP fuses with *enter*'s CS.

(15)


DS: [$_{NP}$ they] [$_{PP}$ into [$_{NP}$ discussions]]
AS: a [a]
into
CS: [BECOME (y , [$_{PLACE}$ AT([$_{PLACE}$ IN(z)])])]

After fusion, *into*'s CS will have the CSs of *they* and *discussions* in place of y and z:

(16) *into* CS: [BECOME ([THEY] , [$_{PLACE}$ AT ([$_{PLACE}$ IN ([DISCUSSIONS])])])]

When this CS fuses with the CS of the verb, the theme in the verb's CS is identified with THEY. Our argument tests confirm that the theme of this version of *enter* does not link:

(17) NF *The entering of enemies into discussions can be difficult.
*The descending of submarines into the ocean depths can be risky.

(18) APF *The enemies appeared entered into discussions.
*The submarines appeared descended into the depths.

(19) MF *Enemies don't enter into discussions easily (cf. willingly)
*These submarines don't descend into those depths easily.

Unlike *go*, this *enter*'s PP is optional, and in Chapter 3 we analyzed its other intransitive unaccusative version, represented as in (20), in which the only linking CS argument is the theme:

(20) DS: entered [$_{\text{NP}}$ several noisy] (at once)
|
AS: [a]
|
enter
CS: [BECOME ([$_{\text{THING}}$] , [$_{\text{PLACE}}$ AT [$_{\text{PLACE}}$ IN [$_{\text{THING}}$]]])]

Here, since the outer PLACE and the nested PLACE and THING inside it are all implicit, and the theme is the only linking argument, then according to the ILH, this theme must link internally. This is still the case, as our internal argument tests confirm:

(21) NF The entering of too many noisy concert-goers can make performers angry.
The descending of certain submarines can take a long time.

(22) APF the recently-entered concert-goers
the recently-descended submarines; the (un)descended testicle

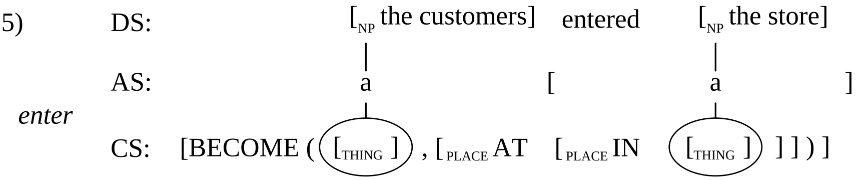
(23) MF Those concert-goers entered easily.
Those submarines descended easily.

Finally, the two-argument transitive *enter* verb class, in (24), also continues to link as analyzed earlier.

(24) Many students enter contests.
The actors exited the stage.
The nude descended the staircase.
The passengers left the 747.
The camels crossed the desert.

With one external and one internal argument, they link as in (25).

(25)



And here there is no risk of a PADF violation because *customers* and *the store* are not in an additional subject-predicate relation. It is clear that the subjects of these transitive verbs are external arguments, as they pass the *-er* external argument test, as shown in Chapter 3, (65a).

(26) a. an enterer of contests b. contest-enterer
a leaver of parties party-leaver
a crosser of deserts desert-crosser
a descender of staircases staircase-descender

And, as predicted, the grammatical adjectival passives, middles, and nominals in (27a)-(29a) confirm that the objects of these verbs are internal arguments, which these rules require. In contrast, the forms in (27b)-(29b) are ungrammatical, confirming that the subjects in (24) must be external arguments.[3]

---

[3] Unlike the grammatical nominals in (21) derived from intransitive unaccusatives, those in (29b) are derived from transitives but lack their internal argument. In fact, the nominal forms of *enter* in (21) and (29) are actually ambiguous and must be disambiguated by context, because *enter* has both a transitive and intransitive version and because *of*-NPs can also correspond to the external argument of a verb (as discussed in Chapter 2 (29)).

(27) APF a. Only one contest remained unentered
the unentered contest
the uncrossed desert

b. *The students remained unentered.
*the unentered students
*The camel remained uncrossed.
*the uncrossed camel

(28) MF a. Some contests enter easily.
Some deserts cross easily.

b. *Some students enter easily.
*Some camels cross easily.

(29) NF a. the entering of contests
the crossing of deserts

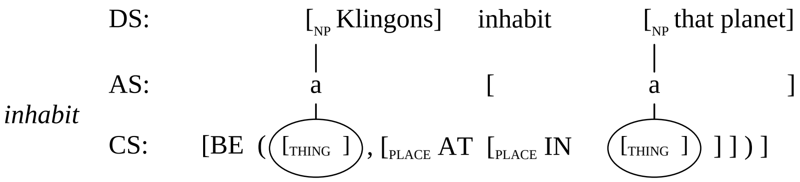
b. *the entering of students
*the crossing of camels

Alongside the *enter* class is the *inhabit* class in (30), which differs slightly: its CS predicate is not BECOME but BE.

(30) a. Klingons inhabit *(that planet).
b. Members occupied *(those seats).

The CS of *inhabit*, in (31), is parallel to (25).

(31)


DS:
[$_{NP}$ Klingons]
inhabit
[$_{NP}$ that planet]
AS:
a
[
a
]
inhabit
CS:
[BE ([$_{THING}$], [$_{PLACE}$ AT [$_{PLACE}$ IN [$_{THING}$]]])]

These verbs fare as predicted on the internal argument tests. Their object can appear as the subject of an adjectival passive or middle but their subject, an external argument, cannot. (And though *of*-NPs *can* be formed from external arguments, (34b) fails because *inhabit*'s internal object is obligatory.)

(32) APF a. That planet remained uninhabited.
the uninhabited planet

b. *the Klingons remained uninhabited.
*the uninhabited Klingons

(33) MF a. Some planets inhabit easily.
b. *Klingons inhabit easily.

(34) NF a. the inhabiting of newly discovered planets
b. *the inhabiting of Klingons

Because they have an external argument, these verbs are predicted to allow *-er* affixation parallel to (26). However, *inhabiter* and *occupier* may be supplanted for some speakers by *inhabitant* and *occupant*, but this is an inconsequential lexical idiosyncracy:[4]

(35) a. an inhabiter of tenements
tenement-inhabiter

b. the first occupiers of the territories
territory-occupier

In sum, then, the *enter* verbs continue to link as outlined above because, unlike the *go* verbs, they are not affected by Clausal Fusion and the PADF.

10.3 More on Replacing GO with BECOME

Chapters 7, 8 and 9 have been concerned with the implications of our linking theory for the representations of a number of verb classes across the lexicon. The idea of Clausal Fusion together with the PADF forced us to reanalyze many verbs and the new analyses have turned out to be supported by our argument structure tests. In the first two sections of this chapter, however, we confirmed that our analyses of other verbs can stand. These included verbs with adjuncts like *bag* and *butter*, intransitive *enter* with no PP (*everyone entered at once*), transitive *enter* (*Many students enter contests*), and *inhabit*. We now turn to a different innovation which can also still stand, our move in Chapter 1 to streamline the set of CS primitives. Now that we have laid out enough of our theory to make our case, we can show that the move was justified.

In establishing our inventory of CS primitives in Chapter 1, we followed Dowty (1979) and departed from Jackendoff (1990) in claiming that GO and its two PATH arguments, [$_{\text{PATH}}$ TO . . .] and [$_{\text{PATH}}$ FROM . . .] are not primitives. Rather, GO should be analyzed as BECOME, with PLACE as its argument. Taking this tack means that location/state verbs and change-of-location/state verbs – including verbs of motion toward an endpoint (a goal) and verbs of motion away from an endpoint (a source) – have essentially identical CSs. This is true for both non-causative and causative verbs, as shown in the chart in (36).

---

[4] *-ant* may itself be an indicator of external argumenthood for this class of verbs. And note that there is a meaning difference between *occupant*, which seems to refer to the original people and *occupier* which refers to invaders.

(36)

	non-causative		causative		
change of location (toward)	*go*	[$_{pp}$ to NP]	*put*	NP	[$_{pp}$ into NP]
change of location (away)	*depart*	[$_{pp}$ from NP]	*remove*	NP	[$_{pp}$ from NP]
change of state	*become*	[$_{XP}$]	*make*	NP	[$_{XP}$]
location/state	*be/stay*	[$_{XP}$]	*keep*	NP	[$_{XP}$]

These verbs' CSs are shown in (37) and (38). (37) contains the non-causative CSs, (38), the causative CSs.

(37)

a.	*go*:	[BECOME	(x ,		[$_{\text{PLACE-c}}$	AT	. . .	])]
b.	*depart*:	[BECOME	(x ,	NOT	[$_{\text{PLACE-c}}$	AT	. . .	])]
c.	*become*:	[BECOME	(x ,		[$_{\text{PLACE-a}}$	AT	. . .	])]
d.	*be/stay*:	[BE	(x ,		[$_{\text{PLACE}}$	AT	. . .	])]

(38)

a.	*put*:	[CAUSE	(w ,	[BECOME	(x ,		[$_{\text{PLACE-c}}$	AT	. . .	])])]
b.	*remove*:	[CAUSE	(w ,	[BECOME	(x ,	NOT	[$_{\text{PLACE-c}}$	AT	. . .	])])]
c.	*make*:	[CAUSE	(w ,	[BECOME	(x ,		[$_{\text{PLACE-a}}$	AT	. . .	])])]
d.	*keep*:	[CAUSE	(w ,	[BE	(x ,		[$_{\text{PLACE}}$	AT	. . .	])])]

The portion of CS that the verbs all share is: [BE (x, [$_{\text{PLACE-c}}$ AT . . .])]. That is, they all entail that x (comes to) BE AT (IN, ON, UNDER, etc) a PLACE. However, the CSs vary along three dimensions: whether they contain COME in addition to BE (i.e., whether they are *change of* location/state or pure location/state verbs); whether they contain NOT; and whether and how their PLACE is annotated. PLACE-c, where c stands for concrete, can refer to a location but not a state; PLACE-a, where a stands for abstract, can refer to a state but not a location; and an unannotated PLACE can refer to either, as shown in (39).

(39)

PLACE-c	*put*	She put the books on the shelf. *She put the books tidy.
PLACE-a	*make*	*She made the books on the shelf. She made the books tidy.
PLACE	*keep*	She kept the books on the shelf. She kept the books tidy.

By replacing GO with BECOME we can see how apparently distinct semantic classes of verbs share a CS core. It also enables us to unify what in Jackendoff's theory are three types of CS primitives: PATHs toward a goal, PATHs away from a source, and LOCATIONS. And there are other arguments for making this move, beyond the observation that a simpler inventory of primitives is preferable on general grounds.

First, consider linking. In Chapter 3 we pointed out that locations, goals, and sources pattern together with respect to linking rules. In fact, in the various versions of THH and UTAH that we considered there, the linking rules referred to a disjunction of exactly these three theta roles. But why these three roles patterned together was unexplained. Now, under our reanalysis, it is no surprise. They are all instances of the same theta role: the PLACE argument of BE(COME).

A second argument comes from Tagalog (Carrier-Duncan, 1985; p.c.), which has a preposition *sa* that can mean source, goal or location, depending on what verb it co-occurs with. For example, as shown in (40a), with the verb *mag-lagay*, "put" (*mag*-v is the citation form; *nag*-v is past), a PP headed by *sa* expresses a path toward an endpoint to which an object moves. *Sa* with this verb could be translated into English with one of a number of prepositions, for example, *into* or *onto*. (In the examples below, *ang* marks the topic; *ng* marks object. *Sa* is labelled oblique. The *mag/nag* prefix and *um* infix, which alternate, depending on class, indicate that the topic of the sentence is external).

(40)	a.	Nag-lagay	ang	bata	ng	saging	*sa*	*kahon.*
		nag-put	TOPIC	child	OBJ	banana	OBL	box
		'The child put the banana into the box.'						
	b.	Nag-alit	ang	bata	ng	saging	*sa*	*kahon.*
		nag-remove	TOPIC	child	OBJ	banana	OBL	box
		'The child removed the banana from the box.'						
	c.	t-um-irah	ang	bata	*sa*	*gusali.*		
		l-um-ive	TOPIC	child	OBL	building		
		'The child lived in the building.'						

In (40b), with the verb *mag-alis*, "remove (from)", a PP headed by *sa* expresses a path away from the source of movement, and would be translated as a *from* PP in English. Finally, in (40c) with the verb *t-um-irah*, "dwell", a *sa* PP indicates the location of the theme and would be translated most typically as an *in* PP. All of these *sa* PPs are arguments. In addition, *sa Boston* can be added to any of the above to get a pure locative adjunct (not dependent on the CS of the verb), *in Boston*.

Given the range of meanings that *sa* appears to have, what can its CS be? If we were to maintain a three-way distinction between [$_{\text{PATH}}$ TO . . .], [$_{\text{PATH}}$ FROM . . .], and [$_{\text{PLACE}}$ . . .], the answer would not be obvious. Its meaning would have to be specified as a disjunction of these three elements. However, by reducing these three categories to one, we can say that Tagalog *sa* has the CS in (41), where the angled brackets contain optional elements. That is, *sa* is compatible with any verb that contains (41) regardless of whether the verb's CS contains COME and/or NOT.

(41) *sa* [BE <COME> (x, <NOT> [$_{\text{PLACE}}$ AT . . .])]

In contrast, in English the CSs of these prepositions are much more narrowly defined. Purely locational prepositions like *at* are compatible only with verbs with CSs like (37d) and (38d). That is, they are incompatible with COME. *To*, *onto*, and *into* are incompatible with verbs specifying NOT, while *from* requires NOT. Notice that our account of the difference between Tagalog and English prepositions relies on our claim that prepositions have complex CSs. They are not simply PLACEs; rather they consist of entire CS clauses headed by BE(COME), a claim that we independently made to account for the interpretation of intransitive resultatives in Chapter 5, Section 4 and used for many other verb classes. What should be clear by now is that we can collapse location, goal, and source into the single Tagalog preposition *sa*, now that we have eliminated the two types of PATHs as primitives. *Sa*-PPs all designate PLACE.[5]

A third argument for replacing GO with BECOME and PATH with PLACE goes back to Gruber (1965), who claimed that even in English the preposition *from* is semantically very close to the preposition *to*; it is simply its negation. But again, it is not obvious how to capture this if [$_{\text{PATH}}$ TO . . .] and [$_{\text{PATH}}$ FROM . . .] are distinct primitives. By reanalyzing GO as BECOME, we can express Gruber's claim precisely. The CS of *to* is (42a), while the CS of *from* is (42b).

(42)

a.	*to*:	[BECOME	(x ,		[$_{\text{PLACE-c}}$ AT . . .])]
b.	*from*:	[BECOME	(x ,	NOT	[$_{\text{PLACE-c}}$ AT . . .])]

Similarly, *into* is the opposite of *out of*, with a parallel CS, as shown in (43):

(43)

a.	*into*:	[BECOME	(x ,		[$_{\text{PLACE-c}}$ AT [$_{\text{PLACE-c}}$ IN z]])]
b.	*out of*:	[BECOME	(x ,	NOT	[$_{\text{PLACE-c}}$ AT [$_{\text{PLACE-c}}$ IN z]])]

The semantic near-identity of these prepositions is also supported by the fact that they (and the closely related *into* and *out of*) can both head a PLACE XP, to the exclusion of other prepositions, as shown in the resultative construction in (44) and with the verb *turn* in (45):[6]

---

[5] I am indebted to Jill Carrier for these insights on Tagalog.

[6] Not every BECOME preposition is compatible with resultatives:

(i) *She ran her sneakers onto tatters.

(44) a. She ran her sneakers to/into/*at/*in shreds.
She pounded the mango to/into a thick sauce.

b. The roosters crowed them from /out of a deep sleep.
They laughed the performer from/out of the room.
She argued him from/out of his depression.
The hypnotist coaxed the woman from/out of her trance.
The thunder jolted us from/out of our reverie.
She stretched the shoes from a size 7 to a size 8/out of shape.

(45) The substance turned to/into/*at/*in powder.
The substance turned from a powder into a liquid.

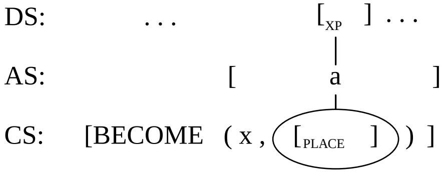
A fourth argument for reducing GO to BECOME is based on the locative-inversion construction in English. The verbs in (46) assert the location of a theme, while those in (47) describe a change-of-location of the theme.

(46) a. In/near the valley of death *sits* a dragon with six hundred heads.
b. At the bottom of the stairs / on the far wall *hangs* a picture of our grandmother.
c. On the edge of the pond *nestled* a snake of a very rare variety.
d. Outside the camp *lies* a large pond full of quite rare fish.
e. Beside the door *stands* an ugly Victorian hat rack that we nicknamed “the Horror”.

(47) a. Into the valley of death *rode* the six hundred.
b. Across the field *ran* a family of mice.
c. Along the edge of the pond *slithered* a snake of a very rare variety.
d. Around the camp *strode* the generals.
e. Through the door *strolled* a man wearing a top hat.
f. From the tree-trunk *emerged* a mysterious-looking wood-sprite.
g. Along the edge of the lake *gathered* a large school of catfish.
h. At the station *arrived* a crowded train from Istanbul.
i. On the computer screen *appeared* a bunch of unreadable characters.

A system that uses BECOME instead of GO can capture these two types of locative inversion with a single rule, operating on inputs of the kind in (48).

(48)



However, whatever this finer restriction imposed by resultatives is, we find the same effect with non-resultative verbs whose CSs contain BE rather than BECOME; *in* but not *on* is allowed:

(ii) Her shoes were in/*on tatters.
The bear was in/*on a deep sleep.
The kids were in/*on a state of inattentiveness.

This is clearly better than a system that contains GO + PATH as well as BE + PLACE, which would need two rules, one that preposes a PLACE and one that preposes a PATH.

In short, there is abundant evidence for eliminating the primitive GO and adopting the simpler, more elegant system based on BE(COME).[7]

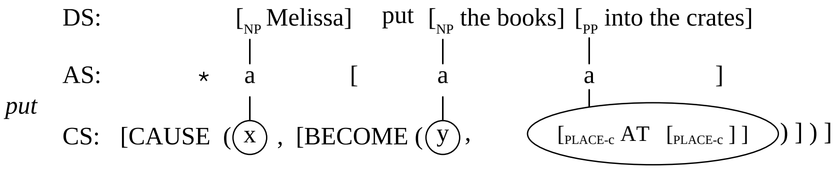
10.4 Conclusions and Further Thoughts

In this book, we proposed a new linking theory, the Isomorphic Linking Hypothesis, and a new approach to combining Conceptual Structures, Clausal Fusion, constrained by the Prohibition Against Double Fusion. Applying these to resultatives in Chapters 5 and 6 led to a major linking finding: in a CS clause in which the PLACE links, the theme does not, and vice versa, a generalization that our argument tests verified for a wide range of verbs across the lexicon. This finding is significant for evaluating linking theories, because no linking theory that links on the basis of fixed semantic roles (eg. UTAH) or any hierarchical linking theory can account for it.

Not only did this finding allow us to handle the contrast between transitive and intransitive resultatives. It also constrained the CS-syntax mapping across the entire verb lexicon and required us to revise the standard analyses of many classes of verbs. This was the focus of Part II of this book and it may be useful here to summarize those revisions.

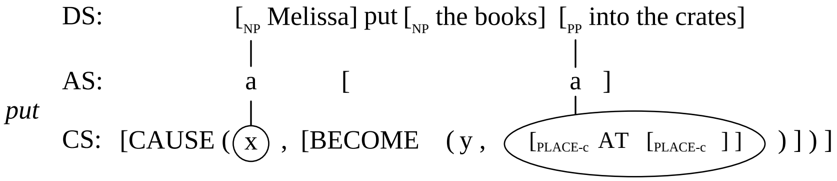
Verbs such as *put*, *get*, and *render*, which are usually assigned three obligatory arguments, in fact, have only two. As shown in Chapter 7, if the theme and PLACE both linked as in the incorrect (49), these verbs would violate the Prohibition Against Double Fusion.

(49)


DS: [NP Melissa] put [NP the books] [PP into the crates]
AS: * a [a a]
put
CS: [CAUSE (x , [BECOME (y , [PLACE-c AT [PLACE-c]])])]

Given that the PP is an argument of the verb, the postverbal NP **cannot** be. And this claim, made for theory-internal reasons, was confirmed by our argumenthood diagnostics. *Put, get,* and *render* link like intransitive resultatives:

(50)


DS: [NP Melissa] put [NP the books] [PP into the crates]
AS: a [a]
put
CS: [CAUSE (x , [BECOME (y , [PLACE-c AT [PLACE-c]])])]

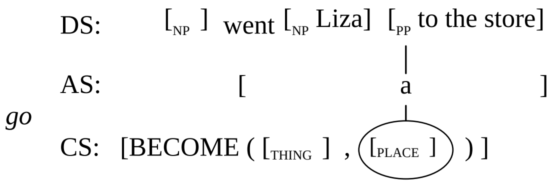
---

[7] For further discussion on replacing GO with BECOME (his INCHoative BE), see Jackendoff (1990:93–95).

The same linking analysis held for verbs whose third argument is optional, such as change-of-location *deliver* (*transmit*, *convey*), and change-of-state *convert* (*change*, *alter*, *transform*). Our tests confirmed that the postverbal NP is an argument only when the PLACE argument is absent. When it is present, the postverbal NP is not an argument of the verb; it is the external argument of the preposition.

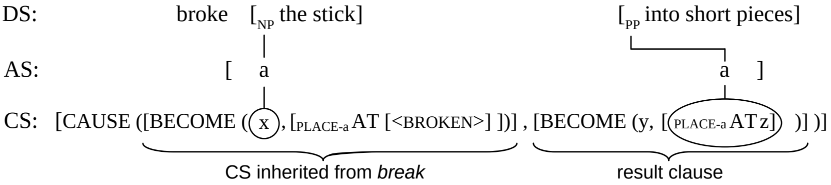
The same logic applied to unaccusative verbs like *go*. Normally assigned two arguments, this verb class, we claimed, has only one.

(51)


DS: [NP] went [NP Liza] [PP to the store]
AS: [a]
go
CS: [BECOME ([THING] , [PLACE])]

But not all unaccusatives work like *go*. The *break* class in (52) has a more complex CS, allowing for its postverbal NP and XP **both** to be arguments of the verb without violating the PADF.

(52)


DS: broke [NP the stick] [PP into short pieces]
AS: [a a]
CS: [CAUSE ([BECOME (x), [PLACE-a AT [<BROKEN>]])] , [BECOME (y, [PLACE-a AT z]))])]
CS inherited from break
result clause

Accomodating both *go* and *break* as unaccusative verbs led us to propose a new definition for unaccusativity (repeated from (77) in Chapter 8, Section 6):

(53) **Unaccusative verb**: A verb whose surface subject originates in DS postverbal position, regardless of whether it is an argument of the verb.

This means that there are two types of unaccusative verbs. For both, the DS postverbal NP moves into subject position to get case, but for one type the postverbal NP is an argument of the verb and for the other it is not. Our theory also accounts for unaccusative resultatives. Because of the complex geometry of their CS, these verbs (as in *The boulders rolled smooth*), have two internal arguments. In this way, unaccusative resultatives are like transitive resultatives (*water*) and unlike unergative resultatives (*run*).

Looking at unaccusatives allowed us to explain the CS representations and linking of verbs that alternate between an unaccusative and an unergative representation (*roll*) and unaccusatives whose prepositional objects alternate as direct objects of causatives (*pierce*, *climb*). Along the way, we proposed that some causative counterparts of unaccusatives are more "complex" (*break*), and link differently from other causatives.

Chapter 9 focused on a range of these “complex” causative verbs, which at first looked like a challenge to our linking theory, but in fact provided support for it. The CS geometry of each of these causatives (*march*, *roll*, *break*, *paste*, *hammer*) is parallel to the CS of its unaccusative or unergative counterpart (if they have one) but for all of them, the complexity of their CS determines their linking as predicted by our theory. On the basis of these insights, we reanalyzed other alternations, including the *spray* and *load* classes, our tests again confirming surprising results about their argument structures.

A number of verb classes did not require a reanalysis, as shown in Sections 1 and 2 of this chapter. Verbs with fusing adjuncts like *bag* and *butter* still link two arguments, as originally proposed in Chapter 4, Section 2. When their adjuncts like *in plastic bags* or *with margarine* fuse, they do not involve Clausal Fusion, and so do not compete with an argument for a single position in CS. Transitive verbs like *enter* and *inhabit*, which are neither causative nor unaccusative, also still link two arguments and similarly pose no PADF threat, as originally claimed in Chapter 2 and Chapter 3, Sections 3 and 4.

Finally, in Section 3 of this chapter, we revisited – and reaffirmed – our decision in Chapter 1, Section 4 to eliminate the CS primitives GO, PATH, FROM and TO (following Dowty, 1979), drawing together the arguments for this move that we gave throughout the book and adding more.

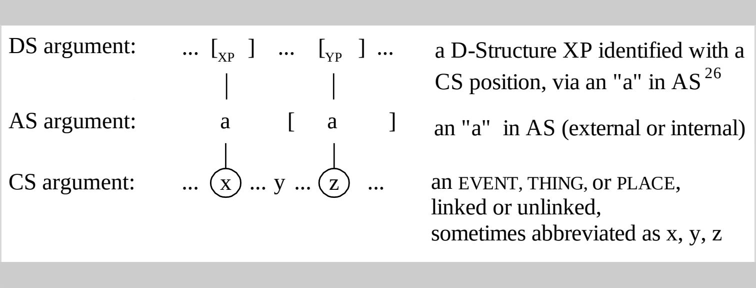
Taking all of this into account, it is clear that the Isomorphic Linking Hypothesis, which claims that tree geometry is preserved from the lexicon to the syntax, has significant explanatory force. Under our new linking theory, the position of syntactic arguments is a straightforward function of CS geometry. An argument’s relative position in CS strictly determines its position in the syntax. With the extensive support for this approach to linking from our results across a wide array of English verb classes, the way is clear to test it on new classes and in other languages.

Summary of Definitions, Principles and Rules[1]

(Chapter numbers appear in **bold**, example numbers are in parentheses; I refers to Introduction.)

1. Arguments and argumenthood

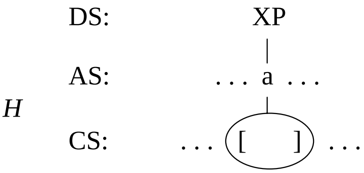
Definitions of argument **2** (53)



DS argument:	... $[_{XP}$] ... $[_{YP}$] ...	a D-Structure XP identified with a CS position, via an "a" in AS[26]
AS argument:	a [a]	an "a" in AS (external or internal)
CS argument:	... x ... y ... z ...	an EVENT, THING, or PLACE, linked or unlinked, sometimes abbreviated as x, y, z

Syntactic argument **4** (123)-(124)

A syntactic argument of a head, *H*, is an XP that satisfies an argument position, *a*, in the AS of *H*.



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[1] The principles, rules, and definitions in this (non-exhaustive) list are given in the version that we adopt or propose in this work. For clarity, some have been adjusted slightly in phrasing or layout. Versions that we do not adopt, or those proposed by other authors (e.g., the Theta Criterion, Adjectival Passive Formation), are discussed in the text and listed in the Subject Index but do not appear here. The chapter and example number for each refer to its first appearance.

J. Randall, *Linking: The Geometry of Argument Structure*, 297–301
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Theta Criterion **1** (26)

Within the argument structure of a predicate,

a. each argument must thematically license one and only one syntactic constituent and

b. a syntactic constituent may saturate one and only one argument

2. CS Geometry

CS Domain **5** (81)

Two CS constituents, A and B, are in the same CS Domain iff A CS c-commands B or B CS c-commands A.

CS c-command **5** (82)

For two CS constituents, A and B, A CS c-commands B iff the first branching CS function node dominating A dominates B.

Asymmetric CS c-command **5** (83)

For two CS constituents, A and B, A asymmetrically CS c-commands B iff the first branching CS function node dominating A dominates B and not vice-versa.

3. Linking

Isomorphic Linking Hypothesis (informal version) **I** (3)

The linking nodes at CS map isomorphically into the terminal nodes in the syntax.

Isomorphic Linking Hypothesis (preliminary version) **I** (7)

The linking nodes at CS map isomorphically into the terminal nodes at AS.

Isomorphic Linking Hypothesis (final version) **5** (84)

The linking nodes at CS map isomorphically into the terminal nodes at AS *within each CS Domain*.

Bound Argument Condition **1** (27)

Given two bound CS arguments, only the higher one is eligible to link to an AS position.

CS - syntax mapping **1** (93)

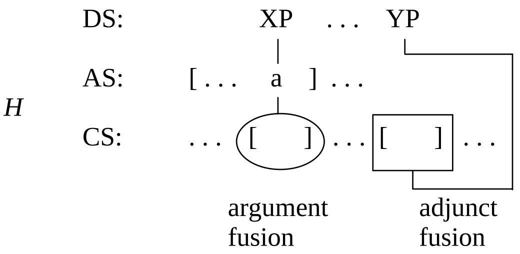
syntax	D-Structure	[. . . XP . . . YP . . . ZP . . .]
	Theta Criterion	
	Argument Structure	a [a a]
	Linking Rules	
lexicon	Conceptual Structure	[CAUSE (x , [BECOME (y , $[_{\text{PLACE}}$ AT ...])])]

4. Fusion

Argument Fusion **1** (31)

For each argument position, *a*, in the argument structure of a head, *H*, (a verb, preposition, noun, or adjective), fuse the Conceptual Structure of the syntactic XP that satisfies *a* into the constituent in the CS that *a* links to.

Argument Fusion and Adjunct Fusion **4** (133)



Prohibition Against Double Fusion **1** (47)

Fusion cannot apply more than once to a CS constituent.

5. Adjunct Rules

***With*-theme Adjunct Rule** **4** (43)

Given the configuration [$_{VP}$ V . . . [$_{PP}$ with NP]]
if the verb's CS contains [. . .[BE(COME) ([$_{THING}$], [$_{PLACE}$])],
then the CS of the NP may fuse with THING.
(adapted from Jackendoff, 1990:169)

PP-Adjunct Rule **4** (75)

Given the syntactic configuration [$_{VP}$ V ... [$_{PP}$ Prep NP]]
if the verb's CS contains [. . . BE(COME) ([$_{THING}$], [$_{PLACE}$])]
the CS of the PP may fuse with PLACE.
(adapted from Jackendoff 1990, p. 170)

6. Lexical Rules

Verbal Passive Formation **2** (20)

Suppress the verb's external argument.

AS of active verb:	a [a]	*Joe* [$_V$ *broke*] *a cup*
↓ VPF		
AS of passive verb:	[a]	*a cup was* [$_V$ *broken*]$_{[-acc]}$ *(by Joe)*

Adjectival Passive Formation

2 (21)

Externalize an internal argument of a passive verb.

AS of passive verb:	[a]	*a cup was* [$_V$ *broken*] *(by Joe)*
↓ APF		
AS of passive adjective:	a [ ]	*a* [$_A$ *broken*] *cup*

Nominal Formation

2 (30)

Suppress the verb's external argument if there is one. Convert V to N.

AS of active verb:	a [a]	*students* [$_V$ *devour*] *junkfood*
↓ NF		
AS of nominal:	[a]	*the* [$_N$ *devouring*] *of junkfood*

Condition on Nominal Formation

2 (29)

An *of*-NP may be:

a. an internal argument

b. an adjunct corresponding to the suppressed external argument

c. an adverbial adjunct

Middle Formation

2 (49)

Suppress the verb's external argument. Externalize the direct internal argument.

AS of active *read*:	a [a]
↓ MF	
AS of middle *read*:	[a]
↓ lexical insertion	
D-structure:	[$_{NP}$] reads$_{[-acc]}$ [that article] easily
↓	
S-structure:	[that article] reads$_{[-acc]}$ [$_{NP}$ t] easily

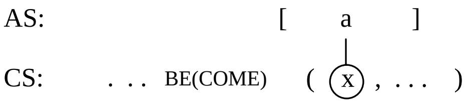
Internal Theme Condition on Middle Formation

2 (45)

MF can apply to a verb only if its lexical representation contains:

a. an internal *a* position in AS

which is b. linked to the first argument of a BE(COME) clause in CS:



Passive Compound Formation **5** (40)

Externalize an internal argument of a passive verb to form an adjective. Insert an adjunct as a modifier of the head.

AS of active verb:	a [a]	$[_{\text{NP}}\ ]\ [_{\text{V}}$ *pick* $]\ [_{\text{NP}}$ *berries* $]$ *by hand*
↓ VPF		
AS of passive verb:	[a]	$[_{\text{NP}}$ *berries* $]$ *are* $[_{\text{V}}$ *picked* $]$ *by hand*
↓ PCF		
AS of passive compound:	a [ ]	$[_{\text{A}}$ *hand* $[_{\text{A}}$ *picked* $]\ ]$ *berries*

Resultative Formation **5** (23)

CS of base verb:	$[_{\text{EVENT}}\ \ldots\ ]$
↓ Resultative Formation (RF)	
CS of resultative verb:	$[\text{CAUSE}\ (\underbrace{[_{\text{EVENT}} \ldots]^{e}}_{\text{inherited CS}},\ \underbrace{[_{\text{EVENT}}\text{BECOME}\ ([_{\text{THING}} \ldots],\ [_{\text{PLACE}}\ \text{AT}\ \ldots\ ])]}_{\text{result clause}})]$

7. Syntactic Phenomena

Actor Test **6** (46)

What [NP] did was ______.

Unaccusative verb **8** (77)

A verb whose surface subject originates in DS postverbal position, regardless of whether it is an argument of the verb.

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